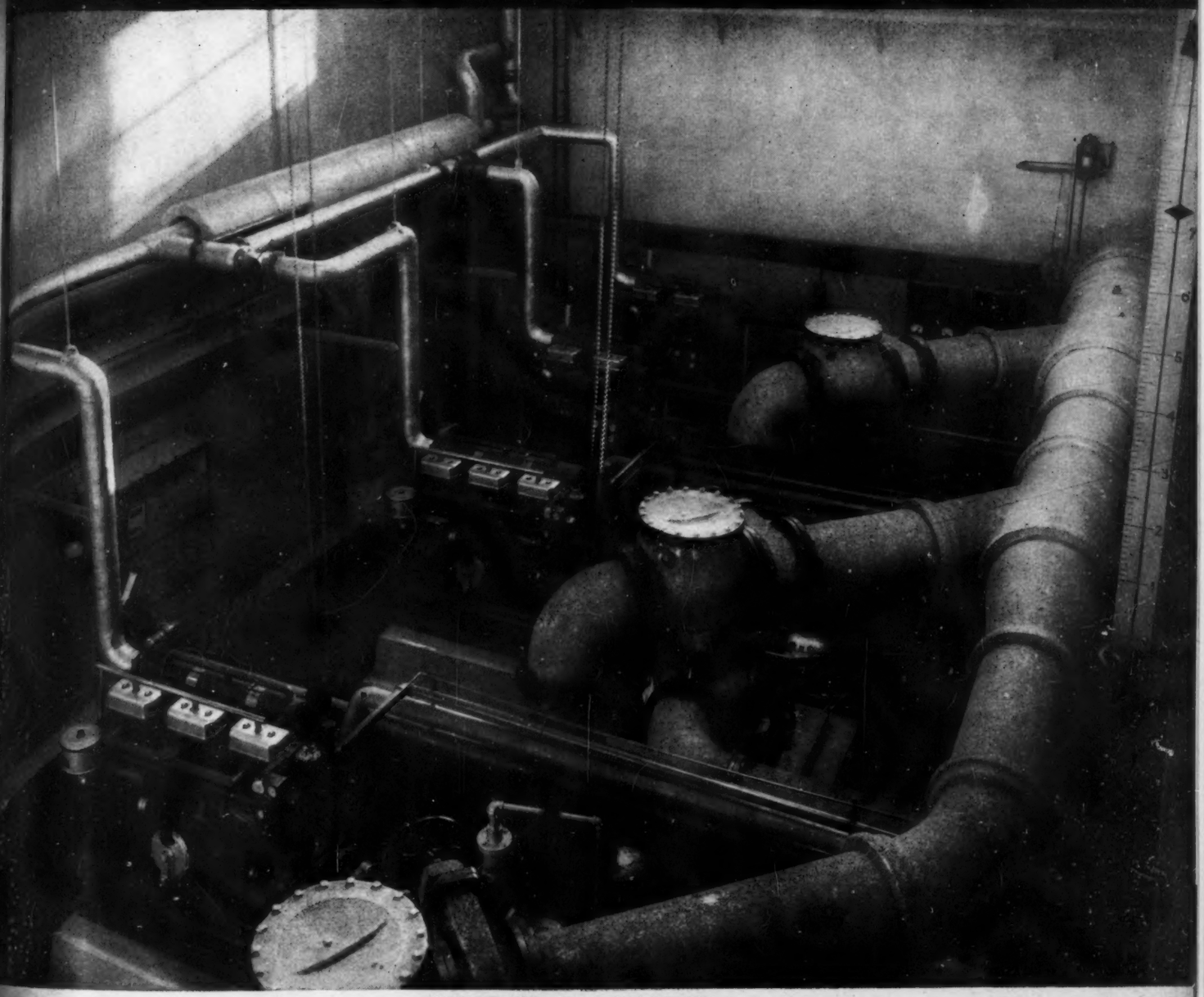
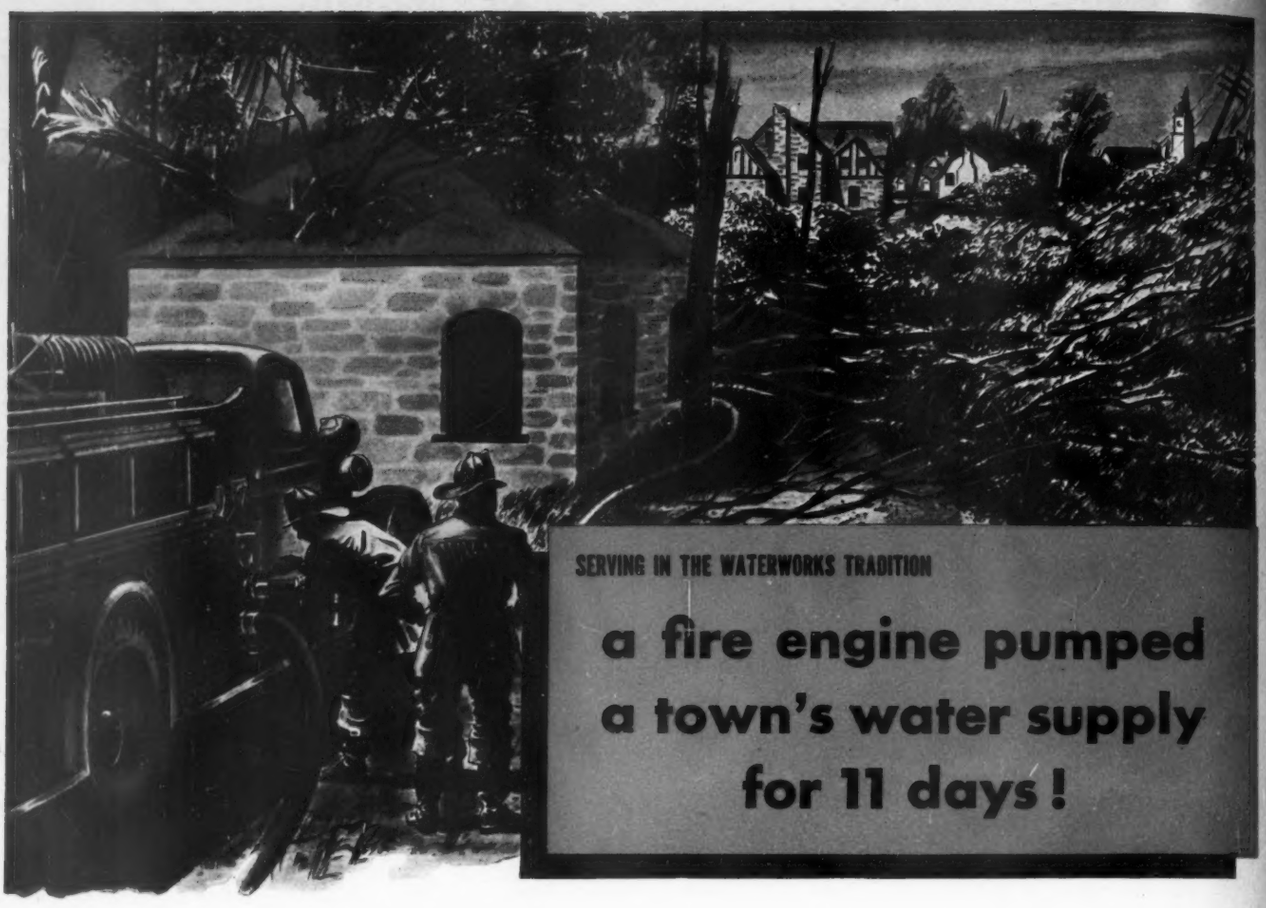
WATER WORKS & SEWERAGE

HBP ABC



AURORA'S GAS ENGINES

AND NOW A PLANT COMPLETELY INDEPENDENT OF OUTSIDE POWER



SERVING IN THE WATERWORKS TRADITION

a fire engine pumped a town's water supply for 11 days!

Emergencies are often the mother of invention —particularly for waterworks engineers. After a recent hurricane, the alertness and ingenuity of a small-town engineer kept the town's water distribution system operating safely when Dame Nature had done everything she could to defeat him.

Normally, this town's water supply comes from a dug well on the west shore of a lake. The water is pumped into the distribution system, and the excess enters a standpipe on a nearby hilltop.

When the hurricane struck, disaster followed disaster. Because of a washed-out dam, the lake overflowed . . . flooding the town's well and pumping station and washing out a water main. Then all the water drained out of the standpipe, and it blew over in the gale. The town was left without a water supply!

Quickly, the waterworks engineer arranged to have water brought in by truck from the neighboring towns, and he chlorinated this water before distribution. Meanwhile he obtained a pumping engine from a nearby city's fire department, and repaired the broken water main. Then for 11 days . . . until the electric motors at the pumping station could be baked out . . . the fire engine, with an emergency hypo chlorinator to treat the water pumped, supplied this town with water!

In emergencies such as this, waterworks engineers have found that it pays to have a supply of Per*chloro*n on hand. This super-test calcium hypochlorite has proved an invaluable standby because of its quick solubility and high chlorine content—more than 70% available chlorine.

Per*chloro*n has also been specified by many waterworks engineers for sanitizing small water systems, new mains, swimming pools and wells. Write us for your *free* copy of our illustrated booklet on Per*chloro*n, full of valuable data on water purification and sewage treatment.

Perchloron

REG. U.S. PAT. OFF.

PENNSYLVANIA SALT MANUFACTURING COMPANY

Chemicals

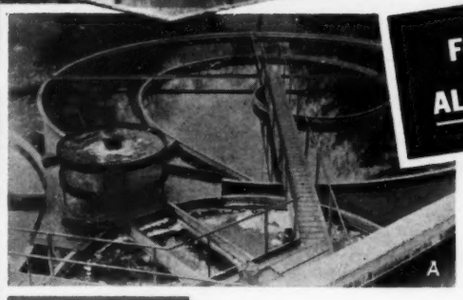
1000 WIDENER BUILDING, PHILADELPHIA

NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • WYANDOTTE • TACOMA

A MODERN ALL-STEEL FILTRATION PLANT for Beckley, West Virginia

by PITTSBURGH • DES MOINES

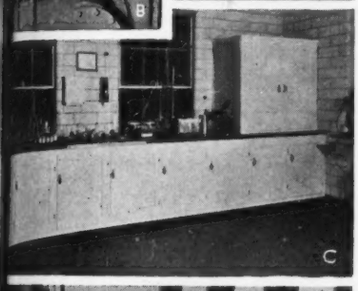
FROM AERATOR TO RESERVOIR— ALL WATER HANDLING EQUIPMENT IS STEEL


A

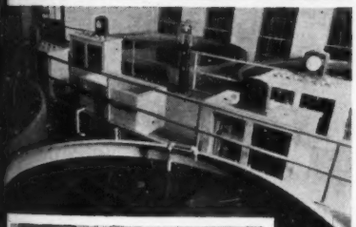
B

-A-
Mixing chamber, aerator, and sedimentation basins.

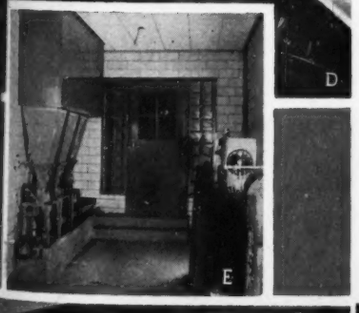
-B-
Filter piping and pipe gallery.


C

-C-
Laboratory


D

-D-
Operating floor: filters, operating platform and table.


E

-E-
Chemical equipment room.

F

-F-
Pump room.

SERVING the progressive West Virginia City of Beckley with a capacity of 2,000,000 gallons per day of purified, sparkling-clear water, this Pittsburgh-Des Moines filtration plant features the use of welded *steel* at every point in the water-handling sequence. Steel is employed for permanence, absolute water-tightness, low maintenance and freedom from cracking or other damage from ground movement or frost. A coat of paint at proper intervals is all that is required to keep the equipment in sound condition for a lifetime.

SEQUENCE OF FLOW

In the Beckley plant, raw water enters through an aerator to a steel mixing chamber provided with mechanical agitation, then flows through two steel spiral baffle sedimentation basins into the steel rapid sand filters (four in number, each with a capacity of 500,000 gallons per day), and then into the steel clear well units—one each of which is built integral with each filter. High service pumps then draw water from the clear wells, delivering it into a one-million gallon capacity reservoir of welded steel, which is located a mile and a half distant from the plant at the high point of the supply main to the city.

OTHER EQUIPMENT

The filter building contains—in addition to the four filter and clear well units—the pump room, chemical equipment room, chemical storage room, laboratory, work room and furnace room. In addition to the two high service pumps, the pump room contains two low service pumps for use during low-water periods at the dam when gravity flow through the system is prevented.

DESIGNED FOR THE FUTURE . . . TODAY!

As the City of Beckley grows, capacity can be added to the filtration plant according to plan, with minimum rearrangement and expense—assuring a continuous water supply of highest quality to the consumer. Thus, Beckley's investment—low in first cost and low in depreciation through economical layout and construction—is designed to return consistent dividends for many years. For a Pittsburgh-Des Moines consultation on the application of a STEEL FILTER PLANT to the water treatment problems of your own municipality, write to the nearest office of this company.

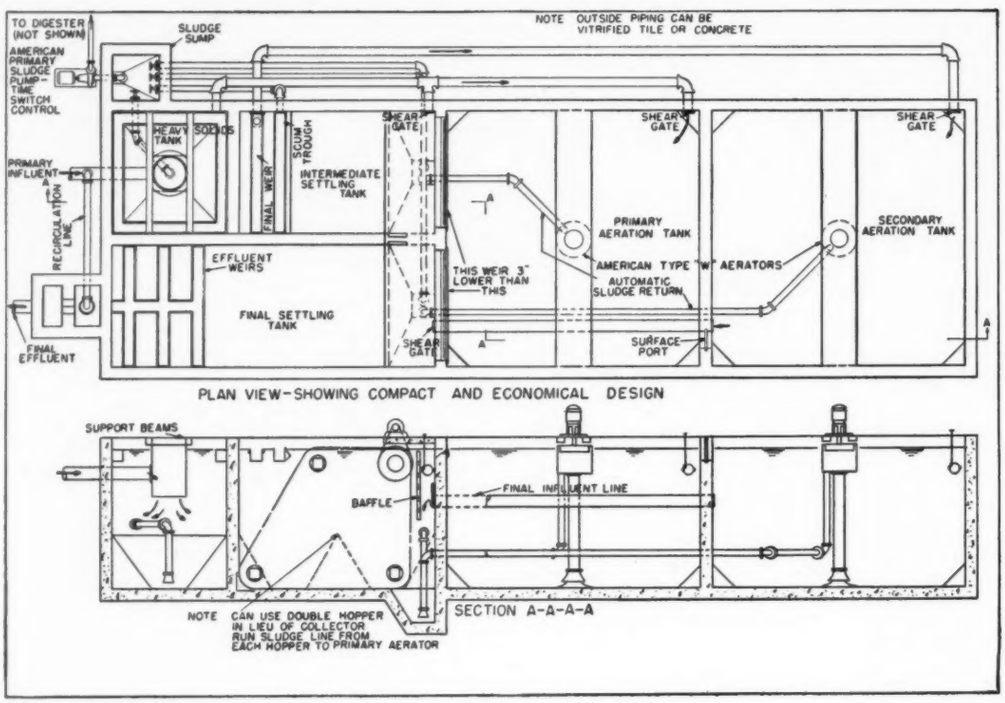
PITTSBURGH • DES MOINES STEEL CO.

PITTSBURGH, P A. 3418 NEVILLE ISLAND — DES MOINES, I O W A, 919 TUTTLE STREET
NEW YORK, ROOM 918, 270 BROADWAY • CHICAGO, 1222 FIRST NATIONAL BANK BUILDING
DALLAS, 1223 PRAETORIAN BUILDING • SAN FRANCISCO, 625 RIALTO BUILDING
SEATTLE, 1126 EIGHTH AVENUE SOUTH

"AMERICAN"
Two-Stage Aeration Plants

FEATURING:

Complete segregation of activated sludges into stages. Recirculation of plant effluent to thwart septification—the enemy of activated sludge.



FOR THE FIRST TIME

Allowing the Unrestrained Application of Activated Sludge to Small Plants.

PROCESS ADVANTAGES

Conditioning of sewage in first stage before final activated sludge treatment.
Greases, harmful ingredients, etc., are absorbed by sludge in first stage. Final stage is protected from ill-effects.
Stale sewages are aerated ahead of protracted settling periods.
Low-Cost recirculation saving aeration "power".
Saving in aeration tank size.
Small head loss through plant.

WATER WORKS & SEWERAGE, August, 1942. Volume 89. Number 8. Published monthly by Gillette Publishing Co., 330 South Wells Street, Chicago, Ill. Per copy, 25c. Subscription rate, United States, $2.00 per year; Canada, $2.00 per year; Foreign, $3.00 per year. Entered as Second Class Matter, June 2, 1931, at the Post Office at Chicago, Ill., under Act of March 3, 1879.

In planning the world's largest water treatment plant . . . .

SOUTH DISTRICT FILTRATION PLANT AT CHICAGO, ILLINOIS

extensive chemical research led to the development of a

SODIUM SILICATE
WATER TREATMENT

DESIGNED TO

—produce a better quality of water

—increase filter-bed capacity

—improve flocculation

• Again the many advantages of Sodium Silicate are confirmed in the decision of the Chicago Bureau of Engineering to use a sodium silicate conditioning process in this twenty-two million dollar project.

Based upon experimental work and actual experience at other plants, the silicate process not only produces water of higher quality, but also serves as a means of materially cutting construction costs through smaller settling basins made possible by higher filtration rates.

The Standard Technical Staff will gladly help you work out a Sodium Silicate treatment for your plant. Use the coupon.

DIAMOND ALKALI COMPANY
STANDARD SILICATE DIVISION
PITTSBURGH, PA.

Plants at CINCINNATI · JERSEY CITY · LOCKPORT, N. Y.
MARSEILLES, ILL. · DALLAS, TEXAS

Standard Silicate Division, Diamond Alkali Company,
Oliver Building, Pittsburgh, Pa.

Our water supply has the following characteristics:

. . . . . Million Gallons per Day Average Turbidity . . . . . .

Present Dosage . . . . . gr./gal. Coagulant . . . . . .

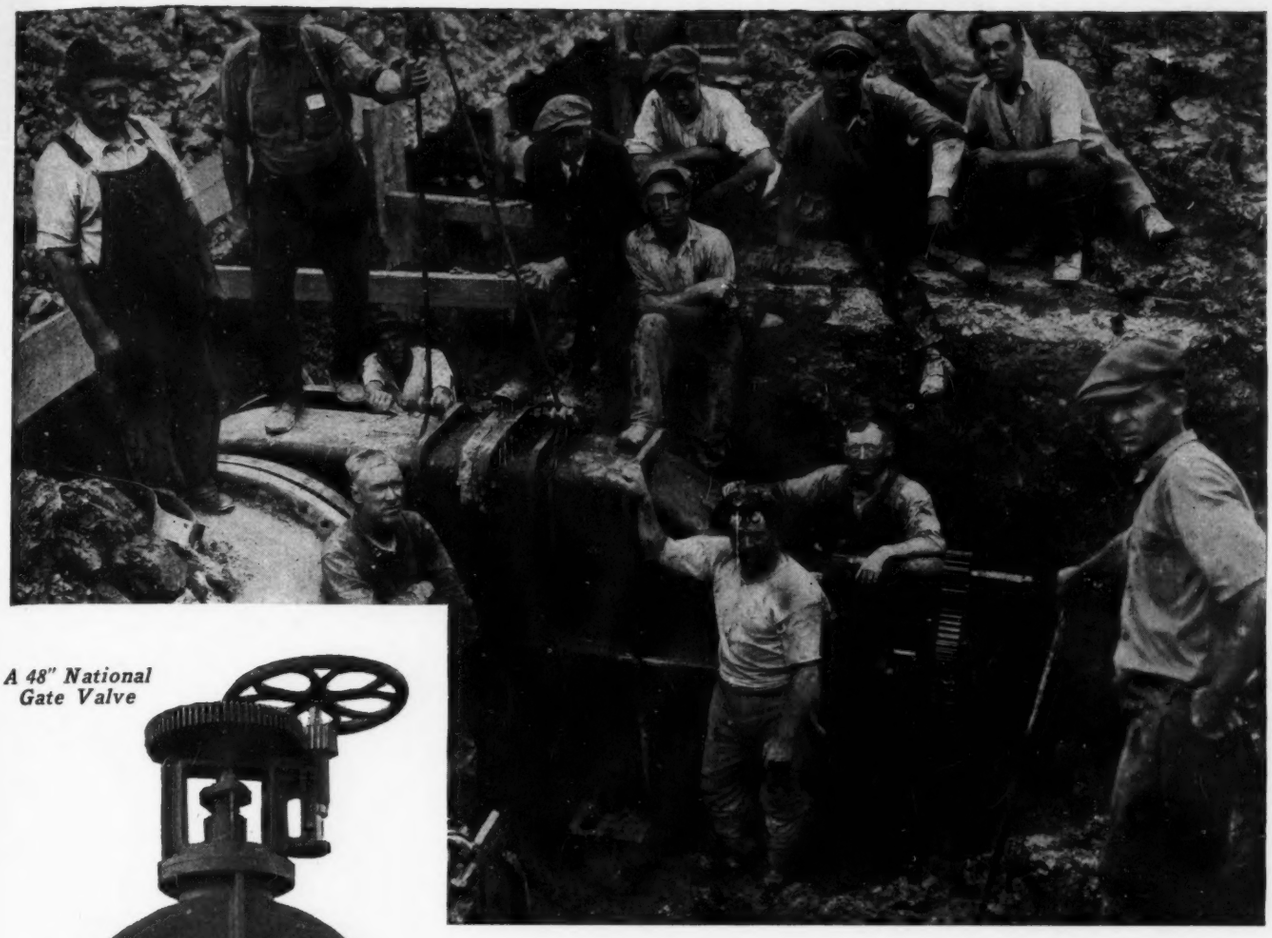
We would be glad to receive further information on the use of Standard Silicate.

Name . . . . . *Title* . . . . . .

Water Works . . . . . *City* . . . . . *State* . . . . . .

Not by Choice
BUT BY NECESSITY AND A PATRIOTIC PRIVILEGE OF DUTY!
Here at the plant of the Mueller Brass Co. every special skill and facility that we possess has been turned to the one main essential purpose of winning the battle of armament production in supplying those things which Uncle Sam requires of us.
Naturally, this is not by choice, but by necessity and a patriotic privilege of duty. We didn't want war business . . . we wanted to keep our peace time markets—to keep on supplying STREAMLINE copper pipe and fittings to the plumbers, steamfitters and water works men of America.
But now our plant is engaged 100% in the production of war materials. Brass and bronze are safeguarding the life of the nation, but after peace is won, we will again manufacture and supply an even better STREAMLINE copper pipe and fittings.
We know that the going now is tough for many of our former good customers—they're doing their part, too, to the best of their ability. There are many restrictions to practically all available business. If you have a problem, it's more than likely that we can help. Write us—we'll appreciate it.
MUELLER BRASS CO.
PORT HURON, MICHIGAN
E
WINNERS OF NAVY "E" AWARD

TIGHT-CLOSING, EASY OPERATING TOUGH VALVES FOR TOUGH SPOTS



A 48" National Gate Valve

A COMPLETE LINE OF GATE VALVES FOR WATER WORKS INSTALLATIONS

You can specify National Gate Valves with full assurance that their time-tested designs and husky construction will operate with fool-proof dependability. The half century record of the National Machine Works in the engineering and manufacture of water works and sewage plant equipment is an unwritten guarantee of satisfaction.

National Gate Valves are built strictly in accordance with the full specifications of the American Water Works Association. They incorporate constructions from which years of experience have eliminated errors in design leading to faulty operation.

For your convenience in obtaining speedy service, the standardized and smaller gate valves are carried in stock. Special constructions to meet your own particular needs will be developed promptly by our engineering staff.

Estimates and engineering counsel are available to you at all times. Write for further information.

NATIONAL

MACHINE WORKS

1559 N. Sheffield Ave., Chicago, Illinois

A PIONEER THEN—

A LEADER TODAY

IN 1892, in a Virginia valley noted for its vast deposits of pure salt, Mathieson began the construction of the first of three great factories. Over a period of half a century, they were to supply America's growing industries with vital chemicals. Today—fifty years later—the Mathieson plants at Saltville, Va., Niagara Falls, N.Y. and Lake Charles, La., are working twenty-four hours a day to supply the nation's *war* industries with the "raw materials of victory."

This is the over-all picture of a typically American enterprise—The Mathieson Alkali Works. It is a story of growth and progress in chemical research... in developing new products... and in devising more efficient methods of handling and transporting chemicals.

Among Mathieson's early achievements was the development of the Castner electrolytic cell for producing chlorine and extremely pure caustic soda. The first to make bleaching powder in the United States, Mathieson pioneered the manufacture of synthetic ammonia, liquid chlorine and such outstanding chlorine products as calcium hypochlorite and sodium chlorite. Chlorine, today in great demand for war production, is also safeguarding the health of our fighting men on all fronts as calcium hypochlorite, the *mobile* chlorine carrier.

These are but a few milestones in the fifty years of Mathieson Chemicals. They are tangible evidence of the drive and initiative which have marked Mathieson's rise from modest beginnings to a place of leadership in the field of industrial chemicals.

CELEBRATING 50 YEARS OF SERVICE TO AMERICAN INDUSTRY AND PUBLIC HEALTH

MATHIESON CHEMICALS

The Mathieson Alkali Works, (Inc.) **60 East 42nd Street, New York, N.Y.**

Improved Pressures

PROVE VALUE OF ELEVATED STORAGE at Olney, Illinois

The difference between 8 lbs. and 48 lbs. water pressure is good service at Olney, Ill.—and the difference is provided by the 400,000-gal. Horton elevated storage tank shown here. Prior to the installation of this unit, pressures at the Olney City Hall fell to as low as 8 lbs. during peak periods. Now, however, water pressure of approximately 48 lbs. is provided at this location during peak demands.

Not only has the tank improved service but it has done so "beautifully." The "Colonial" design radial-cone bottom unit blends harmoniously with the surrounding area and lends beauty to the entire landscape.

Warren and Van Praag, Inc., of Decatur, Ill., served as consulting engineers, recommending and supervising the installation of the tank.

CHICAGO BRIDGE & IRON COMPANY

BIRMINGHAM • CHICAGO • CLEVELAND • DETROIT • HAVANA • HOUSTON
NEW YORK • PHILADELPHIA • SAN FRANCISCO • TULSA • WASHINGTON

"TRUCK HIT A MATHEWS HYDRANT? WE'LL HAVE IT FIXED IN HALF AN HOUR"

The greatest single convenience in hydrant maintenance is the Mathews design which combines all operating parts into one interchangeable barrel.

Whether a Mathews Hydrant is traffic-smashed or needs new nozzles, whether it is to be raised or lowered, whether you want to renew its valve-seat, main valve leather, or drain valve, just unscrew the barrel and lift it out through the loose protection case. Replace it with a spare barrel, and carry the old one back to the shop for convenient service. Just like a spare tire.

A short-handed, war-busy water department is mighty lucky to have Mathews Fire Hydrants. So is the community it protects.

MATHEWS HYDRANTS

400 CHESTNUT STREET, PHILADELPHIA, PA.

ESTABLISHED IN 1803

Made by R.D. WOOD Company

MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

SEE HOW CALGON PREVENTS SCALE IN HOT-WATER HEATER COILS

THIS apparatus, shown at the recent A.W.W.A. Convention in Chicago, gave a dramatic visual demonstration of how Calgon prevents scale in hot-water heater coils.

All the water used in the demonstration was Chicago city water with a small amount of soda ash added to increase the supersaturation with respect to calcium carbonate. On the right side, this water was heated to 160°F. in passing through a Pyrex tube wound externally with wire resistance ribbon, and then flowed through the tubing which forms the word "Scale." Notice the heavy deposit of calcium carbonate which caused this tubing to show up white.

Now look at the word "Calgon." The same water with 2 ppm. Calgon added was heated to 160°F. and flowed through this tubing — but what a difference. The glass stayed crystal clear with no sign of deposit of calcium carbonate.

That is actually what will happen when 0.5 to 2 ppm. of Calgon is added to your municipal water supply. Calgon Treatment *works*, whether your supply is hard and high in bicarbonate, or lime-soda softened. It is effective right to the ends of the line at temperatures even above those used in ordinary water heaters. Preventing scale is important now with replacement coils difficult to obtain. Let us help you produce a truly trouble-free water.

**Calgon is the registered trade-mark of Calgon, Inc. for its glassy sodium phosphate products.*

Calgon solves 4 water works problems

1. **Prevention of scale** from hard, high-bicarbonate waters. Calgon, added at the plant, prevents scale formation in mains, meters and hot-water heaters, throughout the system.

2. **Corrosion control**—Calgon forms a thin protective film on metals and metal oxides at pH values of 5.0 and higher. This reduces the attack of oxygen to such an extent that corrosion ceases to be a problem.

3. **Prevention of "red water"** — Calgon prevents the precipitation of dissolved iron. Thus "red water," either from iron initially present in well water or from corrosion, can be eliminated.

4. **Stabilization of water** following lime or lime-soda softening. Calgon's ability to prevent precipitation of calcium carbonate stabilizes water to the ends of the system.

calgon, inc.
HAGAN BUILDING PITTSBURGH, PA.

YOU NEED THIS TIMELY BULLETIN . . .

AAE
STERILIZATION EQUIPMENT
MODERN long range bomber warfare, with the latest in high explosives, has amply demonstrated its terrible effects. It is particularly significant that the best fortified cities in the world have been captured as a result of efforts to disrupt their water supplies. Enemies who have shelled our shores and sunk our ships within sight of land may soon use long range bombers and acts of sabotage against our Water Works. Our enemies have brought the war to our shores. . . . It has happened here! America's complacency must end. Our eyes must open to the necessity of adequately protected water supplies with standby provisions for refitting a blasted system, including fool-proof Emergency Chlorination Equipment.
All water works, regardless of size, require certain common qualifications in Emergency Sterilization Equipment:
1. Simplicity—Designed so that ordinary people, not "specialists", can put the equipment into operation, adjust it, and make necessary minor repairs.
2. Safety—Elements of danger should be eliminated. Safe, easy-to-handle hypochlorites should be used in place of chlorine gas which is dangerous if amateur service men have to operate emergency chlorination equipment. Machines should be rugged, built to withstand concussion breakage from nearby bombings.
3. Capacity—Should be high, sufficient to handle most emergencies.
4. Moderate price—Every water works should have emergency equipment. The larger systems can afford several moderately priced, high capacity units to provide emergency sterilization at various plants at the same time.
5. Flexibility—Equipment should be able to handle many future peacetime problems as well as present emergency problems.
%PROPORTIONEERS% ARE EMERGENCY STERILIZATION EQUIPMENT HEADQUARTERS!
Dual Drive Chlor-O-Feeders are simple diaphragm or plunger pumps, mass production built through simplicity in construction and standardization of parts. %Proportioneers% have installed more than 5,000 Chlor-O-Feeders in water works, sewage plants, swimming pools, etc., in the last five years. Our units have all the 5 qualifications listed above.
% PROPORTIONEERS, INC. %
EMERGENCY CHEMICAL FEEDER HEADQUARTERS
PROVIDENCE RHODE ISLAND

WHEN WRITING ASK FOR BULLETIN EMM

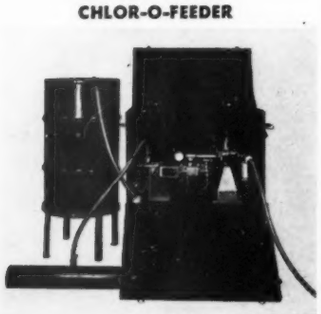
ADDRESS

ABOUT EMERGENCY STERILIZATION EQUIPMENT

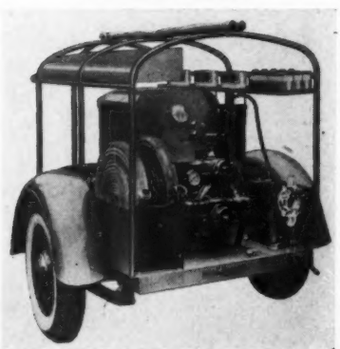
DUAL DRIVE CHLOR-O-FEEDER

METER CONTROLLED MAIN STERILIZER

ALL HYDRAULIC CHLOR-O-FEEDER



THE BLITZ BUGGY



WATER WORKS & SEWERAGE

PUBLICATION OFFICE
330 South Wells Street, Chicago, Ill
E. S. Gillette, Publisher

EDITORIAL OFFICE
155 East 44th Street, New York, N. Y.
L. H. Enslow, Editor

COMING!

"The Role of Bacteria in Corrosion"

Is revealed in a report of studies and experimentation which most definitely points to the fact that living organisms play an important part in corrosion of iron and steel. Evidence secured further conclusively reveals that corrosion and tuberculation of water mains, and red-water or black-water in dead ends and sluggish flow sections in particular, can be brought under control by checking bacterial growths in the film next to the walls of the pipes. The corrective tried successfully was that of maintaining residual chlorine in the water entering the corroding sections. The author is—

A. H. THOMAS, Chief Chemist,
Armco Research Laboratory, Middletown, Ohio.

"The New Storeyard of Akron, Ohio"

Late in 1941 the Water Department of Akron, Ohio, completed a new and modernized $100,000 storeyard and garage facilities, representing a highly useful W.P.A. project, which cost the Water Department about 33% of the entire cost. This well planned asset to the Akron system is described by—

WENDELL R. LA DUE, Sup't & Eng'r.
Dep't of Water and Sewage, Akron, Ohio.

"The Present Status of Biofiltration"

Is reviewed in an article, based on experiences in design, operation, performance and results from many of the 150 sewage treatment plants now employing the high rate-high capacity "Biofiltration" process. There has never been a new process of sewage or industrial waste treatment which became more rapidly and widely accepted and adopted than this one. "*Water Works and Sewerage*" is believed to have carried the first published account of the development of this method which established a new record in economical high degree purification from trickling filters worked under undreamed of loadings, and essentially freed of their nuisance producing factors, withall. We have followed through with subsequent articles revealing progress in this scheme which so appealed to the immagination. In the forthcoming article a new chapter is written, based on wide-spread observations and tests leading to improved design, operating economies, higher efficiencies, and a clearer conception of the basic underlying factors in the "Biofiltration" process. The author, whose articles always seem to "click," is—

"DOC" ANTHONY J. FISCHER, Chem. Eng'r,
Development Dep't of the Dorr Co.

Two Important Maintenance and Repair Articles

"Metallizing"

Tells of the experiences of the Erie Water Department in putting to use this process of sprayed on molten metals to produce protective coatings, on other metal surfaces, to build up worn parts of machinery and save the need for replacements, and other varied uses to which this very useful and flexible process has been put as a modern method in water works and sewerage maintenance. The author, formerly of the Erie Water Dept., is—

C. E. PALMER, President,
Palmer Filter Engineering Co., Erie, Pa.

"Mechanical-Electrical Maintenance of Sewage Plants"

Is an extremely timely contribution in a period when effective and continuous maintenance and repair programs at water and sewage plants has never before rated the importance that it does today. Readers have probably noted the amount of space being given maintenance and repair practices in recent issues of "*Water Works and Sewerage*" and such will be continued and amplified in the interest of economy of materials and release of critical metals for the duration. The forthcoming article on the adaptation of the "metallizing" process is one instance. And, the manifold uses of welding methods used in rehabilitating worn or damaged parts of equipment in the Twin-Cities Sewage Treatment Plant is an outstanding example of what can be accomplished with a minimum requirement of skilled labor and materials. This, however, is just one of the many economy and conservation producing maintenance practices at the St. Paul plant, to be recounted in an early issue by—

STANLEY J. LARSEN, Mechanical Eng'r.
The Minneapolis-St. Paul Sanitary District.

VOL. 89, NO. 8

CONTENTS

AUGUST, 1942

Gas Engine Performance at Aurora 323
By Walter A. Sperry, Superintendent,
The Aurora Sanitary District,
Aurora, Illinois.

A. W. W. As. Wartime Conference 330

A Simple Solution Feeder for Small Flows 338
By E. E. Wolfe,
Superintendent of Filtration,
Hannibal, Mo.

An Experience in Civilian Defense Training 339
By Walter A. Peirce, Manager,
Racine Water Department,
Racine, Wisconsin.

The Role of Chemicals in Industrial Waste Treatment 341
By E. F. Eldridge, Associate Engineer,
Michigan Engineering Experiment Station,
East Lansing, Michigan.

A Portable Emergency Chlorinator 347
By Albion A. Bailey, Acting Filtration Engineer,
Bureau of Water Supply,
Baltimore, Md.

Emergency Repair of Distribution Systems 349
By W. Victor Weir, Superintendent,
St. Louis County Water Company,
University City, Mo.

Canada's Wartime Wages Policy 352
By Ross L. Dobbin, General Manager,
Peterborough Utilities Comm.,
Peterborough, Canada.

Central States Sewage Works Ass'n., Meets in Twin-Cities .. 355

The Protection of Water Supplies During Emergencies 361
By W. L. Mallmann,
Michigan Engineering Experiment Station,
East Lansing, Michigan.

Advantage of Careful Programming of Sludge Transfer 363
By Albert B. Kozma, Superintendent,
The Joint Meeting Sewage Treatment Plant,
Rutherford, N. J.

Editorial 366

Meetings Scheduled .....Ad. Page 70

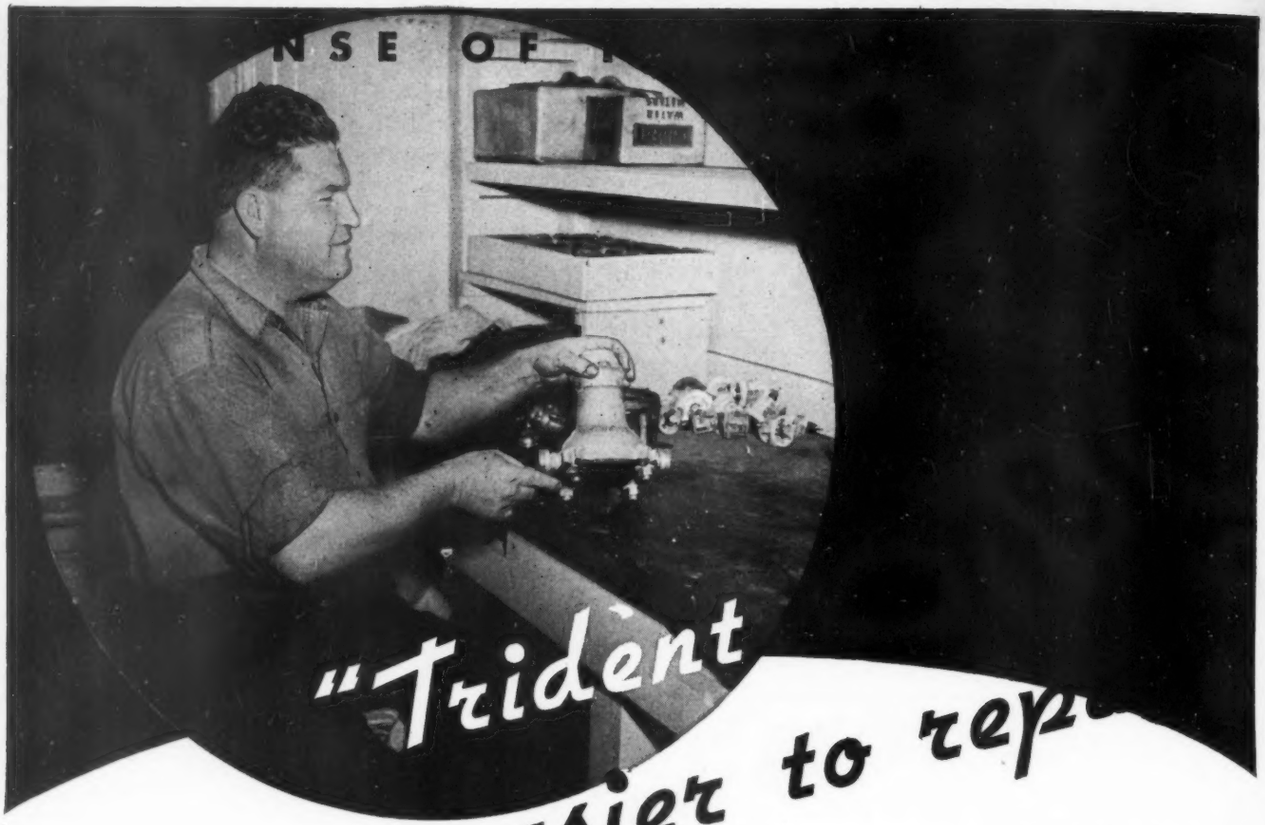
Literature and Catalogs Received .....Ad. Page 73

Equipment News .....Ad. Page 77

Manufacturers' News .....Ad. Page 81

H. P. Gillette, President; E. S. Gillette, Vice Pres. and Publisher; L. H. Enslow, Vice Pres. and Editor; John C. Black, Managing Editor; Associate Editors — J. R. Baylis, A. M. Rawn, H. A. Faber; H. J. Conway, Make-Up Editor; D. G. Ledgerwood, Advertising Editor.

Chicago Office, L. H. Lingnor, Rep., 330 S. Wells Street. Cleveland Office, B. C. Brumm, Mgr., 2025 Lakeland Avenue, Lakewood, Ohio. New York Office, J. M. Angell, Jr., Eastern Mgr., 155 East 44th Street. San Francisco Office, Don Harway, Rep., 420 Market Street.



"Trident ... are easier to rep...

says "HUB" COCHRAN,
who repairs TRIDENT METERS
by sense of touch alone
in the Salt Lake City Meter Shops

And the Trident meters repaired by "Hub" measure up to the same standard of accuracy as those handled by the unhandicapped men in the shops—that is, from 98% to 100%. Truly, this is a fine tribute to Trident simplicity—and to the judgment and skill of an expert workman.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

The fact that Trident Meters are not difficult to repair means that a program of systematic meter-testing-and-repair need be neither expensive nor complicated for your community. Such a program will substantially reduce water waste and, through many resultant savings (in pumpage, coal, chlorine, transportation) will help your Water Works contribute materially to winning the War. Ask for new booklet, Form No. 597e, on meter testing and repair.

NEPTUNE METER COMPANY • 50 West 50th Street • NEW YORK CITY

Branch Offices in CHICAGO, SAN FRANCISCO, LOS ANGELES, PORTLAND, ORE., DENVER, DALLAS, KANSAS CITY, LOUISVILLE, ATLANTA, BOSTON.
Neptune Meters, Ltd., Long Branch, Ontario, Canada.

25

WATER WORKS & SEWERAGE

VOL. 89, No. 8 — *A Gillette Publication* — AUGUST, 1942

GAS ENGINE PERFORMANCE AT AURORA

(Part Three)

The Final Chapter in a Story of Progress Which Ends with Experiences During Fifteen Months of Dependence on Engine Generator Sets as the Sole Power Source

By WALTER A. SPERRY

Superintendent
THE AURORA SANITARY DISTRICT
AURORA, ILL.

ON JANUARY 30, 1941, just as the truck, loaded with the poles, wire, transformers and platforms—all property of the local Public Utility that had been furnishing the district with current—passed the front door of the Aurora Sewage Treatment Works, the entire plant went "dead." Not a light burned or a wheel turned. At that dramatic moment this incident became a figurative "flag dipping" to the departure of the old regime.

The Author

It took two hours of anxious scurrying around before the generators were again on the line and conditions had been restored to normal. The trouble finally proved to be the accidental failure of the fusible link in the gas line flame trap, which was located in a place not easily observed. By no process of analysis would it have been thought of as the cause of the trouble. One touch of the trap lever and the engine started like magic, and all was well again. We could laugh then, but two men had sore arms for three days thereafter trying to start a "one lung" gas engine to get starting air—of which, more later.

Some Developmental History

As reported in two earlier issues of this magazine (January and September, 1937), Aurora realized the first part of a well considered program of engine installation on April 1, 1936, when two 75 HP. engines replaced motor drives on two 8 MGD. pumps. On November 1, 1940, two 50 HP. engine-generator sets were placed in operation. On November 28, 1940, the local power company was notified that we were "on our own" and that its transmission lines could be removed. This completed the full program as planned originally. We know now that we need not have been 55 months "conservative." Engine performance has been dependable, maintenance costs have been low, and troublesome mechanical problems have been essentially nonexistent.

On January 1, 1942, the net result of 69 months' operation of the pump engines and 15 months' operation of the generator engines had accummulated a total savings in current bills, of $27,816.63, against which there has been a total oil, repair and maintenance cost of $2,680.78, leaving a net profit of $25,135.85. The total installed cost of the four engines and all accessories has amounted to $18,321.50. The annual net current bill saving will approximate $6,700.00.

Conditions to Be Satisfied

After the installation of the pump engines (April, 1936), which unloaded a full year "high lift" pumping

Mr. Sperry terms this article the "final chapter" of the story of gas engines in the Aurora plant. Fact is the "final chapter" was begun when the most recent of the engine-generator sets were turned over and the manager of Aurora's plant felt certain enough of his grounds to instruct the local electric utility to discontinue all power service to the plant in toto.

Those of our readers who have followed the accounts in "Water Works and Sewerage" of the carefully planned step-by-step developments of by-product gas engine power by Mr. Sperry, since 1936 *at Aurora, will realize that the author knew that he was secure in his decision to place full dependence on his fully powered plant as promptly as the final tuning up period had been passed.*

Now, with better than a year and a half of plant operation wholly without benefit of standby utility power, Mr. Sperry has demonstrated the truth of his convictions which brings to his credit another accomplishment of merit. He makes a point in an accompanying letter, however, that there has always been maintained a friendly relationship between the plant management and the local electric utility, which was kept appraised of the plans to some day sever the power line into the plant. As a matter of fact, says Mr. Sperry, the utility company has made use of Aurora's gas engine experience in connection with the sale of manufactured gas for engine operation, so there was no element of "surprise" involved when the day arrived for the sewage plant to cease purchase of power and go along "on its own."

cost of about $5,000, there was left a current cost of about $2,000 annually to operate the lights and 30 scattered motors ranging from 50 HP. to small fan units, and totalling 108 HP. The average daily use of current amounted to 204 KWH.'s for power and 10 KWH.'s for light, for which was paid an average of 2.51 cents per KWH.

The 50 HP. motor was not considered since it is used to drive a 6 MGD. pump, not now required. Of the 58 HP. in motors remaining, 14 HP., including the house water pump and gas storage compressor, operate automatically and 12 HP. operate manually, and both as "jump" loads on the generator. The rest of the motors operate continuously.

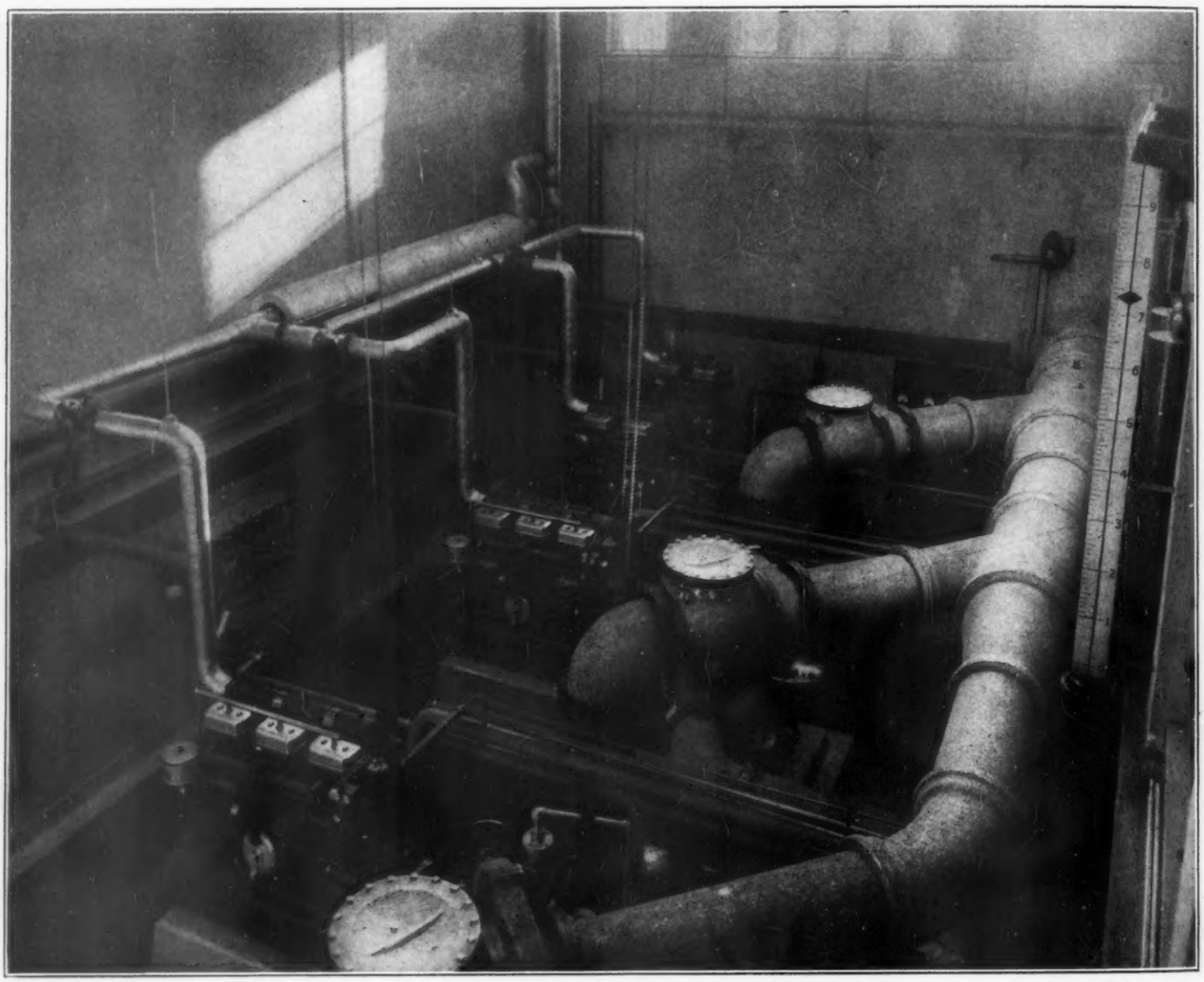
The New Engines

To meet this condition there was purchased two new 4 cycle, 50 HP., 720 RPM. Climax R41 gas engines, double fueled with both gas and gasoline, as were the first engines. These engines are four-cylinder with the cylinders cast in pairs and of the same dimensions as the cylinders on the six-cylinder pump engines so that all cylinder blocks, pistons and connecting rods of all four engines are interchangeable.

The water circulating pumps are integral with the engines. The pump engines have separate motor driven pumps. The generator engines are air start, in place of the motor start for the pump engines. They have double spark plugs but use two magnetos instead of a magneto and battery as used on the first engines. They have air filters, felt oil filters and the usual safety devices to protect them against rise of temperature in the circulating water or lubricating oil failure. The oil pan, however, has a capactiy of 15 gallons as against 6 gallons for the pump engines. They are also equipped with a device for applying a light oil to the valves in the heads. They are connected to the generators with a steel Falk Flexible Coupling.

Generators and Accessories

The generators were made by the Electrical Machinery Manufacturing Co., as were the operating panels. They are direct connected with the exciters mounted on the extended generator shaft. The generators are rated at not less than 44 KVA. or 35 KW. at 80 per cent power factor and deliver 3 phase, 60 cycle current at 480 volts when running at 720 RPM. They are of the revolving field synchronous type with



General View of Aurora's Pump and Engine Room

Pump engines in foreground and generator engines in background. Muffle and heat exchanger equipment along wall at rear. A comparison of this view with the same view on page 12, January, 1937, issue of this magazine shows how the generator engines were connected into the existing equipment.

full amortisseur windings. The 125 volt exciter is of sufficient size to provide 10 per cent greater output than required by the generator for excitation.

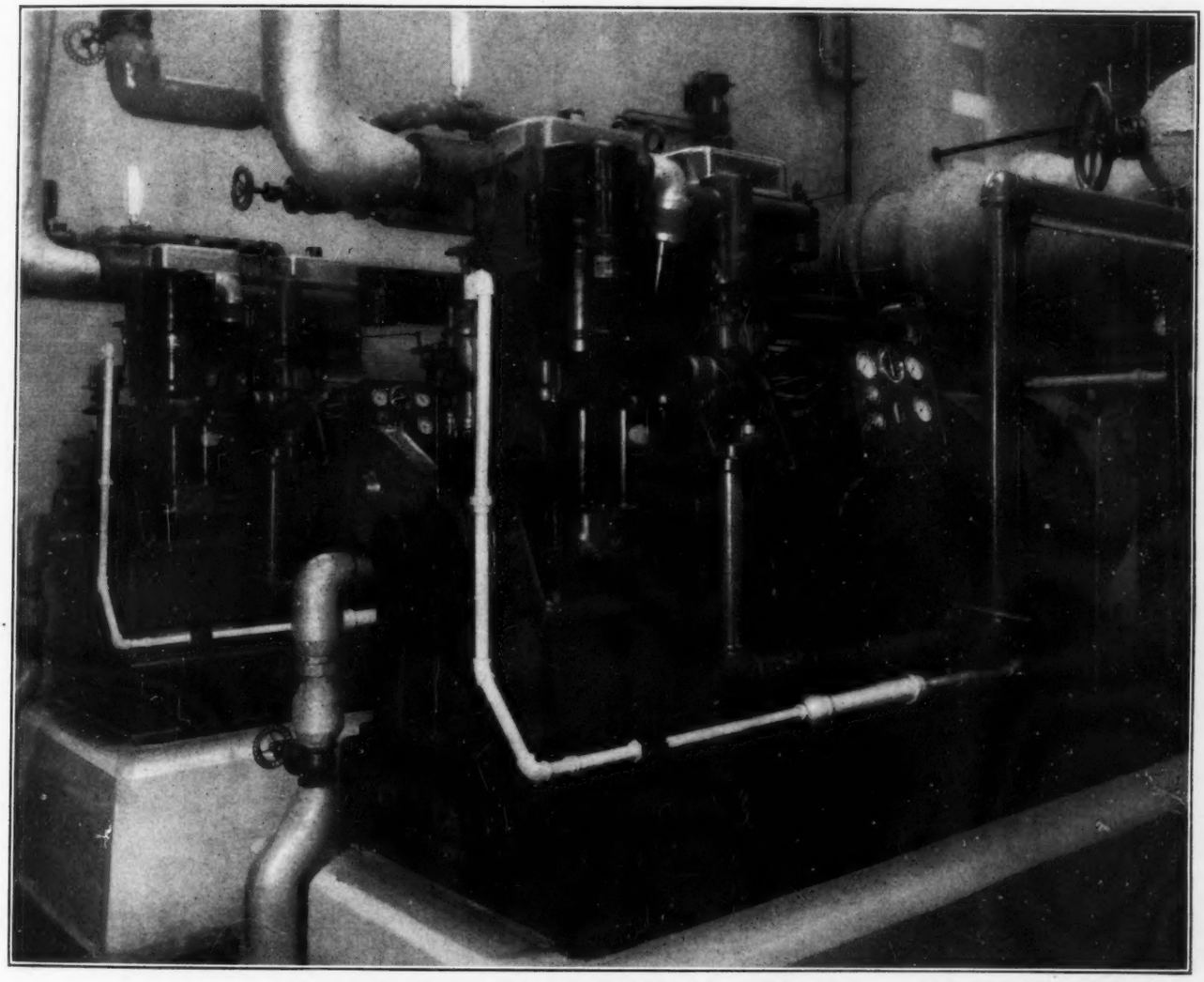
The panels of the two operating switchboards are of the dead-front steel construction type. They are equipped with voltage regulators, operating voltmeter and ammeters, hand rheostat for exciter control, automatic synchronizing device and master switch. They were received completely assembled and needed only to be set and connected to the distribution board.

The special feature of the operating panels are the inclusion on each of the Electric Machinery Manufacturing Co.'s form E "synchrostat" voltage regulator. This device enables one to start either "cold" engine and bring its generator "on the line" automatically with the operating engine.

When the changeover is made each week, the "synchronizer" of the "cold" engine is set on its running position. The cold engine is started and by either (a) manipulating the gas throttle or (b) manipulating the governor rod, the speed of the oncoming engine is adjusted either up or down through the speed at which both engines are synchronized and the "load" is then carried on both boards by both units. The "hot" engine is then shut down. The "load" has been transferred to the oncoming "cold" engine without any disturbance to the equipment "on the line" at the time. This device works well and has given no trouble, provided care is taken to keep the points of the voltage regulator in good adjustment. This is best done by use of a small portable voltmeter.

The 440 volt power leads from these boards replace the 440 volt utility company's connection on the general distribution board, which needed no alteration. The integrating watthour meter with its maximum demand equipment and the watthour meter showing current consumed for lights was purchased from the power company and left in place.

The engine starting air equipment provides sufficient air for three to four starts at 250 pounds gauge. It is unique in having the compressor operated by both a motor or a "one lung" gas engine, simply by changing the drive belt. Running without "outside" stand-by power, this is an important feature. With utility operated motors, if the pump engines stopped, the plant would merely operate as a "primary treatment" plant and no particular harm resulted. Independent of the utility, if the generator engine shuts down, everything



Engine-Generator Sets at Close Range from Rear End

Air and oil filters, gas and gasoline carburetors and throttles, the two magnetos and the air start valve are all clearly shown.

stops and the results might be serious. Every effort was made, therefore, to so select both engine-generator and accessories as to insure uninterrupted dependable operation.

This fact gives the second (stand-by) engine its greatest value. Either unit is capable of operating the plant with about 50 per cent of reserve capacity so that two or more 10 HP. motors can be added in some future addition without more than equalling the present generator capacity. As now operated, the engines are alternated on the "line" each week and there is always an idle engine standing by. [A horse in the barn and two kinds of feed in the mow, as it were.]

As originally purchased, great stress was laid on the ability that the two engine sets must have to be able to run "synchronized" so as to add to the small motor load the 50 HP. motor driving the 6 MGD. standby pump, if and when required.

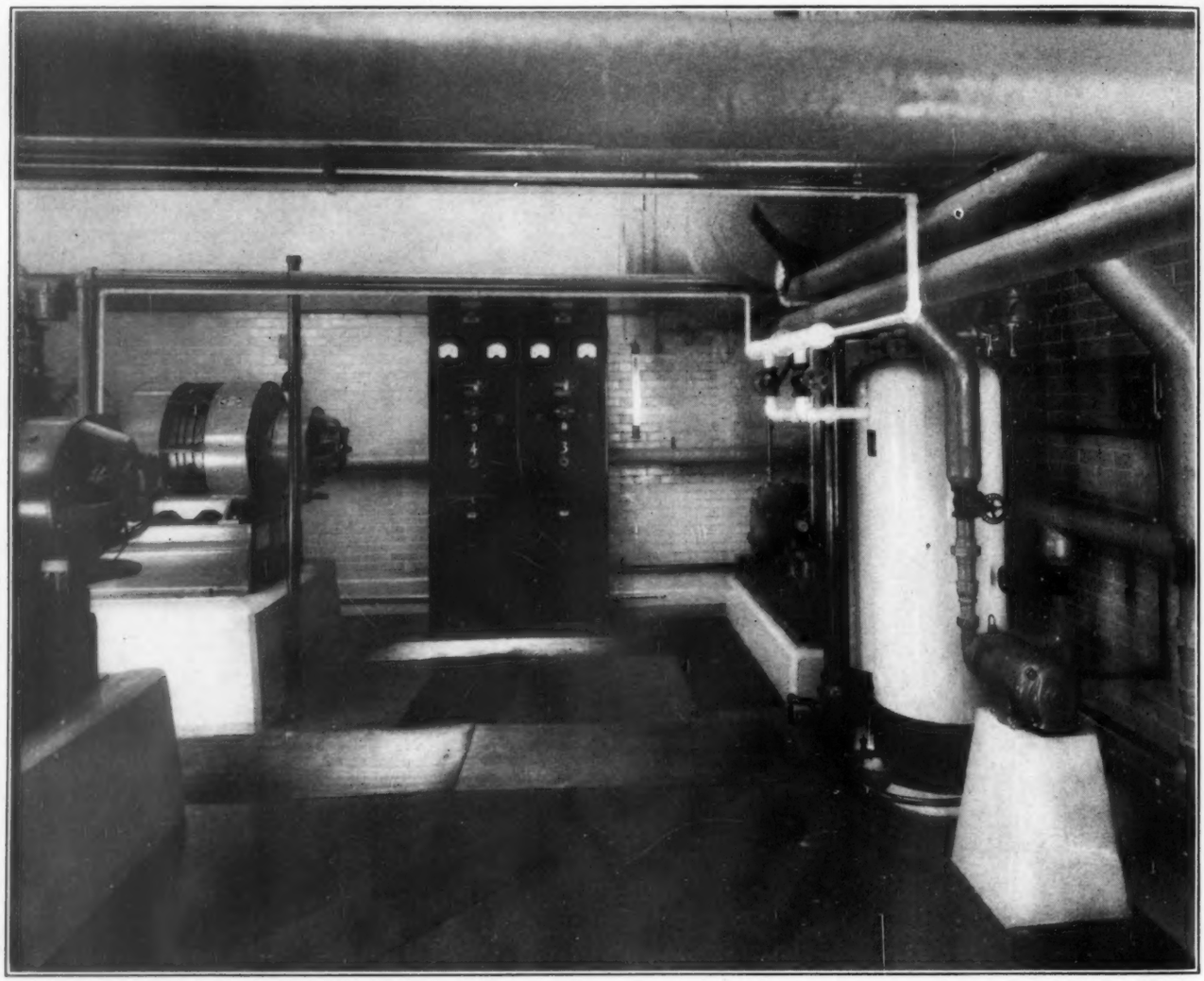
It will be long before this time comes. At present we operate the two units in parallel for a few minutes at monthly periods so as to operate the 6 MGD. pump for "prophylactic" purposes. In practice, however, when it is really necessary to use the second pump it will be equipped with its own gas engine, as are the other two. This in order to preserve the protection of the stand-by engine for the routine operation of the plant.

With reference to the "three days of sore arms," the one cylinder gas engine came equipped with a short crank. No matter how well conditioned such an engine may be, it is "mule stubborn" to start. It is easy to start, however, when the crank is replaced with a notched pulley wheel and a piece of sash cord.

As the general view of the equipment accompanying this article shows, it was possible to so arrange the apparatus as to give a pleasing sense of order. The engines are well spaced and the back ends of the engines line up perfectly so as to keep the exhaust pipes in line. The servicing pipes to the engines were brought in from the other side in four straight parallel groups that gives the whole set-up the appearance of an original and planned installation.

Cost of Equipment

The new units were planned for as a part of a W. P. A. project. They were installed by the plant personnel with some W. P. A. labor assistance on the foundations.



General View of Accessories

View showing rear ends of generators with the operating panels at rear and air start equipment at right. Note air compressor in corner with both motor and gas engine drive. Note voltage regulators at top of operating panels. Immediately below are seen the operating volt and ammeters. Below these at center are placed the automatic synchronizers.

The cost of $9,800, ready to run, is distributed as follows:

Two engine-generators and appurtenances	$8,000.00
Cartage and placement of units on foundations	315.00
Electrical work	460.00
Welding—exhaust lines	44.25
Pipe and valves	300.00
Flame trap	87.00
Cement, foundation material and pipe coverng	40.00
Meters, transformers, etc.	177.18
Engineering and legal expense	376.57
Total cost	$9,800.00

Performance Data

Tables 1 and 2 present the performance data of the new units and need no particular interpretation. Since the behavior of the two units was so nearly identical and the number of hours use practically the same, the details of performance are given for the No. 3 unit only, with the totals and averages for the No. 4 unit below for completeness of data and comparison purposes. (See Table 1.) The complete data for both units appears in Table 2.

Table 3 gives the details of the heat recovery realized. At the time of making the original installation, muffle and heat exchanger equipment was placed of a sufficient size to anticipate the addition of the new units under discussion. Since these accessories are common to all four engines, it is no longer possible to compute heat recovery for the two sets of engines separately.

With the pump engines operating only, the average BTU's per day in the gas to the engines was 11.6 million and to the digester circulating water 4.6 millions. With the addition of the new units the BTU's to the engines increased to 18.4 millions and to the digester circulating water 9.2 millions. For an increase, therefore, of 60 per cent of BTU's to the engines, the increase of BTU's to the digester circulating water was 100 per cent.

In the meantime the per cent of the total gas production for the plant used by the house and digester

TABLE 1—DETAILS OF GAS ENGINE OPERATION

Months	Days in Service	Hours in Service	—Cu. Ft Gas— Per 24 Hrs.	Per K.W.H.	—K.W.H. Produced— Power	Lights	Total	B.T.U. Gas (Net)	Avg. H.P. Dev.	—B.T.U.— Per B.H.P.	Per K.W.H.	Gals. Oil Used
Generator Engine No. 3												
January	14.0	336	10,380	18	3,060	281	3,341	612	16.7	15,840	26,560	..
February	14.0	336	10,290	19	3,000	233	3,233	586	16.1	15,600	26,100	15
March	17.0	408	10,400	18	3,720	289	4,009	504	16.6	13,180	22,200	..
April	16.0	384	10,350	18	3,660	228	3,888	608	17.0	16,000	26,900	..
May	15.9	382	10,760	22	3,640	186	3,826	594	16.7	15,900	26,800	15
June	14.3	343	10,320	21	2,824	153	2,977	596	14.5	17,700	29,600	..
July	14.0	336	10,190	20	2,800	102	2,902	610	14.4	17,800	30,000	..
August	16.0	384	10,270	19	3,320	145	3,465	607	15.1	17,000	28,400	15
September	16.0	384	10,140	20	3,260	240	3,500	603	15.3	16,900	28,400	..
October	15.0	360	10,810	18	3,360	278	3,638	576	16.9	15,530	26,000	3
November	15.0	360	10,550	18	3,480	267	3,747	580	17.4	14,600	24,400	6
December	14.0	336	10,660	19	3,040	302	3,342	586	16.1	16,160	27,000	18
Totals	181.2	4,349	1,888,800	..	39,164	2,704	41,868	...	...	.....	.....	72
Averages	...	....	10,420	19	216	15	231	590	16.12	16,020	26,860	..
Generator Engine No. 4												
Totals	183.6	4,406	1,922,700	..	40,116	2,655	42,771	...	...	.....	.....	72.5
Averages	...	....	10,490	19	219	14	233	590	16.25	16,020	26,840	..

(Please note that the high B.T.U. per B.H.P. is due to the low 32 per cent loading of the generators.)

TABLE 2—GENERATOR ENGINE SUMMARY TABLE

[Fourteen months—Nov. 1, 1940-Jan. 1, 1942]

	Engine No.3	Engine No. 4	Combined
Total hours of operation	5,045	5,174	10,219
Total K.W.H.—Power	45,874	46,396	92,270
Lights	3,296	3,223	6,519
Total	49,170	49,619	98,789
Total horepower hours	81,527	83,922	165,449
Average developed H.P.	16.16	16.19	16.18
Average K.W.H. per day	231	233	232
Total cu. ft. gas used	2,191,800	2,266,400	4,458,200
Average cu. ft. per H.P. hour	26.8	27.0	26.9
Average cu. ft. per K.W.H.	44.5	45.6	45.05
Average net B.T.U. of gas	590	590	590
Average B.T.U. per H.P. hour	15,850	15,950	15,900
Average B.T.U. per K.W. hour	26,650	26,600	26,625
Total gals lubricating oil	87	87	174
Gals. oil per H.P. hour	0.00107	0.00104	0.00105
Lubricating oil-developed H.P. hours per gallon	935	961	953
Total maintenance cost	.....	.....	$436.11
Maintenance cost per developed H.P. hour	.....	.....	0.00263

TABLE 3—HEAT RECOVERY DATA FOR COMBINED PUMP AND GENERATOR ENGINES

	Cubic Feet Gas Per 24 Hours	Dig. Cir. Water of— Inlet Water to Water Exch.	Outlet Water to Water Exch.	Outlet Exhaust Heat Exch.	Dig. Cir. Water, Gals./Day	—B.T.U. (Millions)— To Gas Engs.	To Dig. Cir. Water	Per Cent Heat Recovered
January	31,130	116	120	121	141,290	19.00	5.86	30.9
February	30,230	112.8	115.7	118.4	141,530	17.71	6.60	37.2
March	29,200	107	110	112.6	140,950	14.73	6.57	44.6
April	30,410	116.7	119.9	123.2	141,800	17.30	7.70	44.6
May	34,300	116	122	126	138,580	20.37	11.55	56.8
June	30,000	108	110.8	117.3	143,790	17.90	11.10	61.8
July	31,820	131	134	140	141,680	19.41	10.58	54.5
August	32,670	126	130	135	131,650	19.81	9.85	49.7
September	34,080	134.6	139.1	144.1	142,950	21.30	11.30	53.1
October	29,030	133.5	137.1	141.8	144,530	17.03	10.00	58.7
November	29,400	119.0	122.4	127.6	146,050	17.63	10.45	59.3
December	32,360	119.0	122.7	127.0	141,630	18.96	9.30	49.1
Total	11,432,700	....	....	....	51,589,100	....	....	...
Averages	31,320	120.0	123.6	127.8	141,340	18.43	9.24	50.0

heating boilers dropped from an average of 32.8 per cent in the years 1936-40, with the pump engines only, to 11.4 per cent last year with both sets of engines running. This was anticipated since the house heat boilers are connected in series with the heat exchangers and the amount of gas burned in them is regulated by the heat supplied to the circulating water by the engines. At present there will be much of the time when these boilers will not be required, especially in the spring, summer and fall months.

Cost to Maintain

The direct maintenance, operation and oil cost of the generator sets is for the 14 month period from November 1, 1940, to January 1, 1942, and the amounts to $114.62, detailed as follows:

Meter charts	$ 6.94
Check valve	2.03
Oil gauge repair	5.00
Lubricants	9.38
Upperlube oil	11.90
Tachometer repair	8.05
Regulator repair	7.00
Gasoline	6.49
Oil—regular	57.83
Total	$114.62

To this must be added 50 per cent of the following special items of expense, incurred in getting the two units permanently organized into their respective settings:

Exhaust line repair	$ 12.25	
Two-way horn	19.05	
Copper tubing	6.63	
"Standby" circulating water pump and motor	172.76	
New cylinder blocks	337.45	
Upperlube oil—1 bbl.—	94.83	
Total	$642.98	50% = $321.49

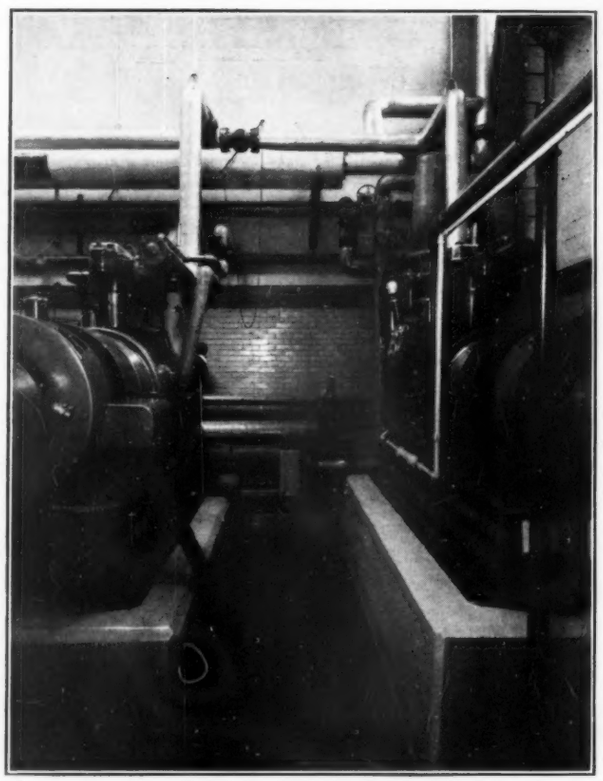
Total maintenance charges used in computing earnings, therefore, $436.11.

Returns on Investment

The earnings of the generators since December 1, 1940, to January 1, 1942, have been computed on the "cash" basis, since Aurora does not make use of any sinking fund arrangement and the new equipment was paid for in spot cash.

Recently a sewage treating neighbor came to visit Aurora stating that they had an abundance of gas and inquiring if Aurora was pleased with its experience, to date, in the supplying of its own current. Also, what does Aurora say to their utility company's statement that engines would have to be replaced in ten years? Aurora's reply to this was, "Nonsense." In 69 months the cylinders of the first engines have only recently been rebored. Never has it been necessary to remove or give attention to the crankshaft. With rebored cylinders, Aurora considers the engines as good as new again and the life of the engines appear indeterminate. As parts wear out they are replaced.

In the beginning earnings were computed on the



View Between Generator Sets

Muffle shown at top along wall. The exhaust exchange heater is at right with bypass valves and exhaust bypass. Water to water jacket exchanger at bottom.

"capitalized" plan. The engines were amortized on a basis of 12 years as the certain life of the engine. Aurora thinks this figure is too small. With longer life periods for the engines, depreciation and interest figures become much less. Therefore, the "cash" basis as a means of accumulating and comparing earnings seems sufficient.

November, 1940, is not included in the earnings exhibit since this was a month of "warming up" and trial. For that period we ran with a temporary double-throw switch between the plant and the local utility. This was never used, and although the plant supplied its own current for that month, the utility's regular bill was paid in full as a friendly gesture of farewell. This proved good diplomacy that left a kindly reaction.

Earnings Exhibit

Cost of engine-generators installed.....$9,800.00
Power and light savings due to generators:
Power: 85,880 KW @ 2.183c $1,874.76
Lights: 6,054 KW @ 4.0c plus $195.00 437.16

Total savings due to plant generators.....$2,311.92
Cost for oil, repairs and maintenance: 12/40-1/42 436.11
NET SAVINGS (Dec., 1940-Jan., 1942).....$1,875.81

$\frac{\$1,875.81}{\$9,800.00} \times 100 = 19.1\%$ return, as of Jan. 1, 1942.

Notes and Comments

The distribution of gas-use in two "before and after" years of equal daily gas production shows the following:

	—Year 1938— Pump Engs. Only Cu. Ft./Day	%	—Year 1941— Pump—Gen. Engs. Cu. Ft./Day	%
House and Digester Heating	17,320	36.6	5,570	11.4
Pump engines	16,670	35.2	20,880	42.9
Generator engines	None	....	10,440	21.4
Incinerator	7,050	14.9	6,080	12.5
Wasted	6,290	13.3	5,760	11.8
Total	47,320	100.0	48,730	100.0
Average flow per day.	7,233 M.G.		8,413 M.G.	

One of the most satisfying "gadgets" added to this system during the year was a two-way horn that gives warning of impending danger *before* it has occurred. This horn was placed in the wall of the pump room with one horn sounding in the main part of the building. An extension was placed on the outside horn so that it could be heard as far away as the secondary tanks on the river edge, a distance of about 1,000 feet. This horn was connected to two Minneapolis-Honeywell temperature regulators. The capsule of one was placed in the engine circulating water system. The capsule of the other was placed at the outlet of the exhaust heat exchanger. The wiring was so arranged as that whichever of these positions reached a temperature of 176-178 degrees Fahrenheit first, the horn would begin to sound. It remains sounding till the difficulty is located and corrected. This usually gives some 5 to 7 minutes (depending on engine speed) to locate the difficulty before the temperature reaches 190 degrees Fahrenheit, when the engine safety devices operate automatically to shut the unit down. Usually one of the circulating pumps has stopped and adjustments are quickly made. The device is simple and positive. Its use saves the danger of an overheated engine, should it shut down and not be immediately noted.

An oil consumption experience occurred in the early part of 1942 that may well be related here. In the years 1936-40 the oil consumed by the pump engines averaged 0.0004 gallon per B.H.P.Hr. In the year 1941 this consumption rose to 0.00057 gallon per B.H.P.Hr. This was an increase of 42 per cent, but no note was taken of it since it was known to be due to "pumping," the result of worn cylinders, which was corrected late in 1941. After the engines had been equipped with new cylinders, however, the oil consumption increased to 0.001 gallons per B.H.P.Hr., or 150 per cent over the normal expectation for what was considered new engine conditions. This was alarming, especially in view of possible embargoes on oil and no direct cause could be found save that the rings were suspected. The original rings consisted of two plain rings; the third, a wiper ring with a recess on its lower edge and an oil ring with a central slot and a recess in either half so that the surface presented to the cylinder wall was very narrow. The rings supplied with the new cylinders consisted of three plain rings. The oil ring had the central slot, but no recess, so that the surface presented to the cylinder wall was quite three times the surface presented by the original rings. After this discovery the rings were immediately changed back to the original type. The oil consumption dropped off immediately to near the original quantity. This change was made on all four engines. An examination of the replaced rings showed them to have been of harder material and not well "worn in" after 50-70 days' run.

The use of distilled water in the engine circulating water system for the purpose of avoiding scale in the engine jackets has been discontinued. Water from the plant supply is now used. To it is added about one pound of "Calgon" (Sodium Hexametaphosphate) for each 100 gallons. This plan is much more convenient and scaling is entirely prevented.

On July 22, 1942, there was a severe electric storm accompanied by a 2.5 inch rainfall. No disturbance of any kind occurred to the generator equipment. Had we been powered by the utility there would have been complete interruption for a considerable period, as has happened with most electrical storms. This experience was gratifying. It helped to prove that the Aurora venture in independent operation was reasonably sound. There now is the four-fold protection against interrupted service of

A—a duplicate engine, ready to take the load.

B—two kinds of fuel at the throttle.

C—two ways to get starting air, motor and gas engine.

D—absence of electrical disturbances.

Further than this, the interest cost on the second unit is less than the stand-by cost of a utility connection. In contrast to this present set-up there was formerly a single power line into the plant placed five miles from the power house and subject at any time to storm or other interruption.

Whether Aurora stands alone as the only plant working independent of power from a local utility is not known. Certainly there are not many. It is doubtful, however, in view of experiences to date and the care taken to safeguard dependable continuous operation whether Aurora is assuming an undue risk. The Aurora plan of duplicate units has always been considered a profitable investment in both dependability and longer life.

On January 1, 1942, we had accumulated profits 37 per cent greater than the entire cost of the installation. Net profits now accumulate at the rate of about $6,700, or 36.5 per cent annually.

So long as food is necessary to maintain life there will always be an abundance of gas from sewage, not to mention garbage. Aurora, therefore, has partially attained the impossible at the fence of "cost to operate" with its "bootstraps."

A.W.W.A'S. WARTIME CONFERENCE

And Sixty-Second Annual Meeting — Chicago, June 21-25, 1942

AS EXPLAINED in our July issue this report, covering A.W.W.A.'s impressive and highly beneficial Conference on Wartime Water Works Problems, was held over a month in order that the important address of the Chief of the Power Branch of the War Production Board and the address of the new president of the Association could be reproduced without delay.

The Retiring President
L. R. Howson, Mrs. Howson and Miss Louise H.

The potentialities that this meeting of the National Water Works Association held for members of A.W.W.A., and many others who came to Chicago, was promptly indicated by the early registration records. Considering the many things of the present to deter men from leaving the job, taken together with transportation difficulties, the registered attendance that promptly mounted to 1438 in itself proved that A.W.W.A. is performing a great service to water supply authorities in the present emergency. Taken by itself this 1438 figure does not mean much, but when realizing that it is only 7 less than the 1445 registration in 1941 at Toronto when this country had not been drawn into the war, it takes on more significance. Further, it comes to within 29 of equalling the all time A.W.W.A. convention attendance record established at the thoroughly ballyhooed Kansas City convention in 1940.

More significant than the registration figures was the attendance of the meeting sessions—there being no equal of this at any previous convention. The sessions opened more promptly than ordinarily. The members came more nearly on time and remained late. The programs had been carefully planned and topics synchronized. In all more than 100 speakers were heard—many in well coordinated and illuminating panel type discussions. We feel confident that, measured in terms of getting the most out of the technical sessions by the greatest numbers, the Chicago Conference established an all-time record in this direction.

Smiles That Said Much
(Denoting a conference in every quarter a success)

The New Vice-President—
Samuel B. Morris, Dean of Engineering, Leland Stanford University, California

The Convention Management Chairman—
Wm. J. Orchard, General Manager, Wallace & Tiernan Co., Newark, N. J.

The Executive Secretary of AWWA—
Harry E. Jordan
(Smoking his pet California "hod" in honor of Sam Morris, and "happy about the whole thing.")

Program Highlights

The suprise event, which was not cataloged in the printed program because of uncertainty, was the appearance of J. A. Krug, Chief of the War Production Board's Power Branch, who flew out to Chicago and spent just enough time to address the Conference on "War Production Policies and Water Works Practices" and to extend his remarks at a Board meeting which followed. Mr. Krug's address, intently listened to in an overflow special session, together with floor questions and answers, printed in full in our July issue. The Keynote in his straight forward talk was the fact that water utilities have been building up an inventory of equipment and materials beyond that permitted under Order P-46 and that these inventories must be reduced if water works are to continue to be accorded the same perferential treatment so far enjoyed in respect to securing critical materials. Every water works man (and sewerage men also) are urged to read Mr. Krugs address and his clarifying answers to questions. Then he may well look to see that his house is in order.

The New President
Abel Wolman, Mrs. Wolman and "Reds" W.

WPB's Chief of Power Branch, J. A. Krug, in a surprise landing from Washington, spoke to a packed house. At the board meeting afterwards ways and means of cooperation in WPB's wartime efforts constituted the main theme.

Another highlight was the inspiring dinner address by incoming president Abel Wolman—"A Wartime Platform for A.W.W.A.," which also was printed in our July issue.

Honors and Awards

At the closing dinner honorary memberships were conferred upon—

James W. Caird, Consulting Chemist, Troy, N. Y.

Wilfred W. DeBerard, City Engineer, Chicago.

William E. Vest, Supt. Dept. of Water and Sewerage, Charlotte, N. C.

The John M. Diven Medal was presented to—

Samuel F. Newkirk, Jr., Engr. and Supt., Board of Water Commissioners, Elizabeth, N. J.

This, the highest award of the Association, is made to that member who has made an outstanding contribution to the advance of the water works field. Mr. Newkirk was cited for his leadership as Chairman of A.W.W.A.'s Committee on Meters which has recently developed a new set of specifications for meters of the displacement type—published in the Dec., 1941, Journal of A.W.W.A.

Award Recipients

Sam B. Newkirk, Jr., Engr. and Supt., Elizabeth, N. J., Water Dept. (The Diven Medal for an outstanding service to the Association.)

Ray F. Goudey, Sanitary Engineer, Los Angeles Dept. of Water Supply (The Goodell prize for the best paper of the year.)

The Goodell Prize was delivered to—

Ray F. Goudey, Chief Sanitary Engr., Dept. of Water and Power, Los Angeles.

This award is made annually to the member who has contributed to the Journal that paper adjudged the most meritorious. His "Practical Aspects of Cross Connection and Back Flow Protection" was printed in the March, 1941, Journal.

The George W. Fuller Awards, voted by the several sections to that one of their members who has performed some meritorious or distinguished service in the water supply field, were received by the following:

Section	*Recipient*
California	Chas. Gilman Hyde.
Canadian	Robt. W. Angus.
Florida	Wm. B. Gibson.
Four States	Carl J. Lauter.
Illinois	Herbert E. Hudson, Jr.
Indiana	Blucher A. Poole.
Ky.-Tenn.	Robert P. Farrell.
Michigan	Douglas Feben, and Robert Hulbert.
Minnesota	Ronald M. Finch.
Missouri Val.	Wm. T. Bailey.
Montana	Herbert B. Foote.
New Jersey	J. Arthur Carr.
New York	Rollo K. Blanchard.
North Carolina	Wm. C. Olsen.
Ohio (1940)	Thos. R. Lathrop.
Ohio (1942)	Hayes R. Kuhns.
Pacific N. W.	Milton H. McGuire.
Rocky Mtn.	Oliver J. Ripple.
Southeastern	Wm. D. Moore.
Southwestern	Edw. R. Stapley.
Virginia	D. R. Taylor.
West. Pa.	*Jas. S. Dunwoody.
West Va.	Thos. L. Young.
Wisconsin	Wm. A. Peirce.

*Deceased. The award certificate was delivered to Mrs. Dunwoody who was present to receive it.

Illinois Section Hosts

W. W. De Berard, City Engineer, Chicago (Chairman of the local convention committee and recently elected Illinois director, who had honorary membership in AWWA conferred on him during the conference.)

Fred W. Hartmann, Captain, U. S. Engrs. (Formerly of Pittsburgh-National Meters) New Chairman of the Section

Herbert E. Hudson, Jr., Engr.-Designer, Dept. of Public Works, Chicago (Energizing secretary and most responsible for the cup-winning membership gain made by the Illinois Section.)

New Dircetors

W. W. Moorehouse, Director of Water and Sewage, Dayton, Ohio

H. H. Hyman, Vice-President, Consumers Water Co., Miami, Fla.

Edgar W. Johnson, Asst. Chief Engr., Water Dept., Minneapolis, Minn.

Cup Winning Sections

The Illinois section was the winner this year of the Hill Cup, which is awarded each year to the section reporting the highest membership gain. The Illinois section, by go-get-'em methods and a much-alive committee, turned in a gain of 78 new members. Second place was recorded for the Virginia section and Wisconsin was third.

The Minnesota section received the Henshaw Cup, which goes each year to that section which had the highest percentage of its members present at the annual meeting of the section. Second place was won by the Montana section.

Membership in A.W.W.A. Reaches New Peak

President Howson in his remarks concerning membership growth in A.W.W.A., announced that another all-time high in membership had been established—namely, 4,386—and representing a net gain of 350 members between the 1941 and 1942 meetings.

Made Honorary Members

Wm. E. Vest, Supt. of Water and Sewage, Charlotte, N. C. (A former director and for 31 years a member.)

James M. Caird, Consulting Chemist, Troy, N. Y. (A member for 42 years, who served as Assn. Treasurer for seven of these years.)

Officers of the Divisions

The following are the new division officers:

Plant Management Division

Chairman—J. Clark Keith, Windsor, Ont.

Vice-Chmn.—Frank C. Amsbary, Jr., Urbana, Ill.

Secretary — Lloyd Rebsamen, Jonesboro, Ark.

Executive Comm.—H. H. Brown, Milwaukee, Wis., S. S. Anthony, Augusta, Me.

Finance and Accounting Div.

Chairman—W. Victor Weir, University City, Mo.

Vice-Chmn.—Arthur D. Kuranz, Waukesha, Wis.

Secretary—G. B. Schunke, Seattle, Wash.

Snapped at the Ladies' Country Club Luncheon and Bridge

Mrs. Clinton Inglee, Mrs. W. W. Brush, Mrs. Linn H. Enslow, Mrs. Harry E. Jordan, Mrs. Wm. J. Orchard, Mrs Louis R. Hoinson.

Mrs. Arthur Gorman, Mrs. Herbert Hudson, Mrs. Abel Wolman, Mrs. L. R. Howson, Mrs. Sam Morris, Mrs. Paul Hansen, Mrs. Langdon Pearse.*

[**Mrs. Gorman served as chairman of the luncheon and Mrs. Paul Hansen as general chairman of the ladies' entertainment committee. For supplying these two pictures we are indebted to Joe Wafer of Industrial Chemical Sales.*]

Exec. Comm.—J. C. Flannagan, St. Paul, Minn., Geo. F. Hughes, Denver, Colo.

Water Purification Div.

Chairman — Marsden C. Smith, Richmond, Va.

Vice-Chmn. — A. Clinton Decker, Birmingham, Ala.

Secretary — Chas. Cox, Albany, N. Y.

Exec. Comm.—Geo. Turre, Denver, Colo., W. U. Gallaher, Appleton, Wis.

Manufacturers' Annual Meeting

At the annual meeting of the Water and Sewage Works Manufacturers' Association the following were elected officers for the next fiscal year which begins November 1, 1942:

President

Dan S. McAfee, V.P. and Sales Mgr. The Dorr Co., New York, N. Y.

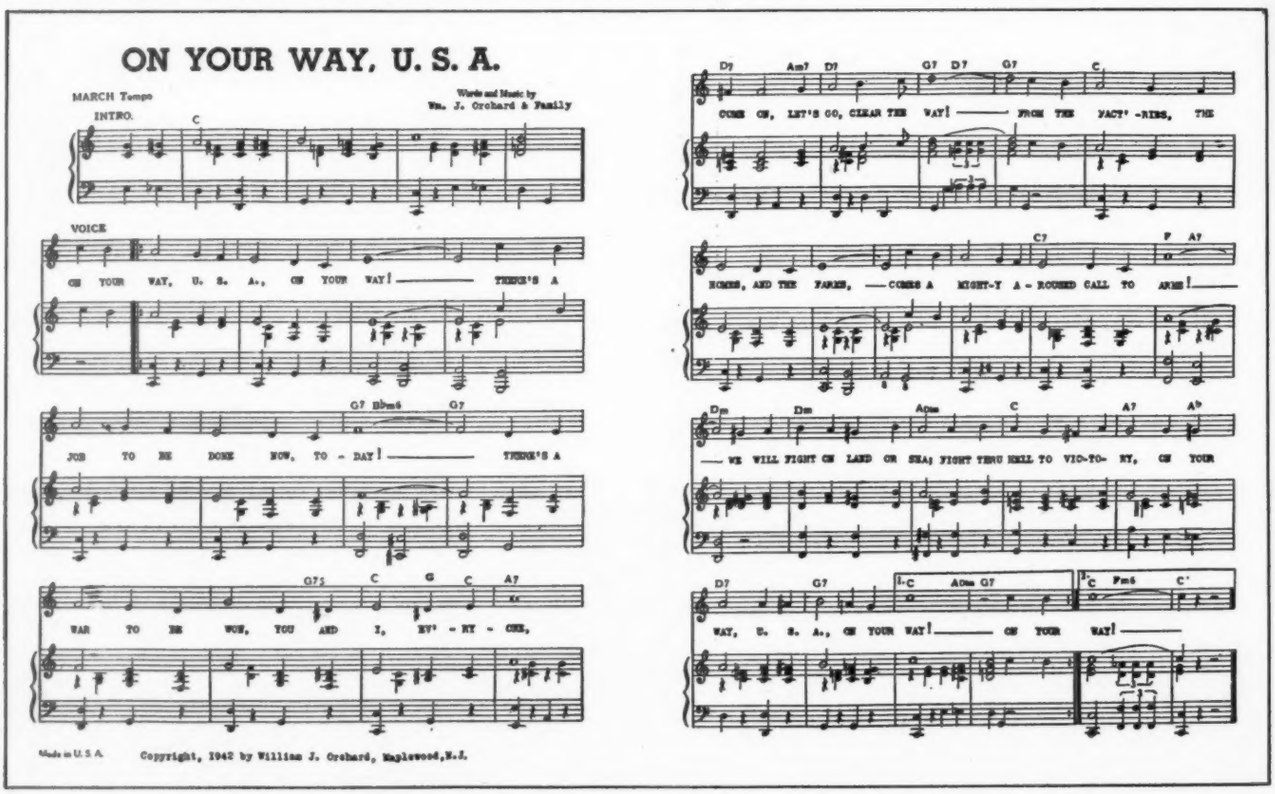
Vice-President

Chas. A. McGinnis, Manager Transite Pipe Div., Johns-Manville Co., New York, N. Y.

Treasurer

Edgar Buttenheim, President "The American City," New York, N. Y.

Secretary-Manager

Arthur T. Clark, Sec'y and Mgr. The W. & S. Wks. Mfrs. Ass'n, New York, N. Y.

ON YOUR WAY, U. S. A.
MARCH Tempo
INTRO.
Words and Music by
Wm. J. Orchard & Family
VOICE
ON YOUR WAY, U. S. A., ON YOUR WAY! —— THERE'S A
JOB TO BE DONE NOW, TO - DAY! —— THERE'S A
WAR TO BE WON, YOU AND I, EV' - RY - ONE,
COME ON, LET'S GO, CLEAR THE WAY! —— FROM THE FACT' - RIES, THE
HOMES, AND THE FARMS, —COMES A MIGHT-Y A - ROUSED CALL TO ARMS! ——
— WE WILL FIGHT ON LAND OR SEA; FIGHT THRU HELL TO VIC-TO- RY, ON YOUR
WAY, U. S. A., ON YOUR WAY! —— ON YOUR WAY! ——
Made in U.S.A.
Copyright, 1942 by William J. Orchard, Englewood, N.J.

The Theme Song of the Chicago Wartime Conference

(Snappy "On Your Way, U. S. A." was composed by Convention Manager "Bill" Orchard, with the assistance of the musical members of the Orchard family. Just try it—it clicked at Chicago.)

W. F. McMurray, City Engr. and Supt. of Water, Tulsa, Okla. Mrs. McMurray

Larry Lingnor, "Water Works & Sewerage" Chicago Mrs. Lingnor

Thos. L. Amiss, Supt., Water and Sewerage, Shreveport, La. Mrs. Amiss

W. C. (Bill) Sherwood, Vice-Pres., Hersey Meter Co., Boston Mrs. J. J. Strasser, Chicago

R. E. (Dick) Wagner, Pres., Zeolite Chemical Co., Medford, N. J. Mrs. Wagner

Mr. Clark, who had already been serving for the past two years as manager of the Manufacturers' Association, was made Secretary as the result of the retirement of John A. Kienle after completing his 25th year as Secretary, and appropriately rewarded upon his "Silver Anniversary" with a sterling cocktail set as a memento from the Association. This handsome gift was appropriately initiated at a party given the retiring secretary by the manufacturers.

Manufacturers' Officers

Dan S. McAfee, V. P. & General Mgr., The Don Co., New York, N. Y. (Elected president by Mfrs.' Assn.)

Chas. A. McGinnis, Mgr. Transite Pipe Div., Johns-Manville Co., New York, N. Y. (The manufacturers' new vice-president)

To the Board of Governors and Executive Committees the following firms were elected for 3-year terms in each instance:

To the Board of Governors:

Johns-Manville Co., Mathieson Alkali Works, Roberts Filter Mfg. Co., Simplex Valve and Meter Co., R. D. Wood Co.

To the Executive Committee of the Water Works Division:

Builders-Providence, Inc. (formerly Builders Iron Foundry), Hersey Mfg. Co., Ross Valve Mfg. Co.

To the Executive Committee of the Sewage Works Division:

Link-Belt Co., Nichols Eng. & Research Corp., Sewage Works Engineering.

Illinois Section Elects

During the Conference the Illinois Section at a brief business meeting elected new officers for the coming year, heard one or two committee reports, endorsed the proposed legislation (Act) to regulate well drilling in Illinois, praised Secretary Hudson, Chairman Gerstein and the Membership Committee for the big boost of 78 new members which ran the total to 206 and won the Hill Cup for the Illinois Section, as previously announced, and adjourned. The new officers are:

Chairman

Capt. Fred W. Hartmann, U. S. Engineers, Chicago

Vice-Chairman

Clifford Fore, Chemist, Water Dept. of Carbondale, Ill.

Secretary-Treasurer

Herbert E. Hudson, Jr., Design Engineer, Dept. of Public Works, Chicago

Trustees

H. L. White, Univ. Illinois
Clarence W. Klassen, State San. Engineer

National Director

W. W. De Berard, City Engineer, Chicago

A War Song Is Born

In shortening the length of the meeting this year by one afternoon and evening there was one less evening of entertainment. However, the functions were well attended and the number of ladies attending the Conference was, we believe, as great as that at any previous convention. They were pleasantly entertained at a luncheon and fashion show at Marshall Field's and a luncheon and bridge party at Chicago's swanky South Shore Club. For the arrangements and management, much credit is due Mrs. Paul Hansen as chairman of the Ladies Committee on Entertainment.

Wartime Practices Committee Team

Boyd A. Bennett, President, Northeastern Water & Elec. Corp., N. Y. C. John A. Kienle, Vice-President, Mathieson Alkali Works, N. Y. City (Other members of this important special wartime committee are Past Presidents Dugger and Howson, President Wolman and Secretary Jordan. Mr. Kienle, representing the manufacturers, retired after 25 years of service as secretary of the Mfrs. Assn. A party in his honor and a memento was given him during the Chicago conference and Arthur T. Clark, now takes up where John Kienle left off.)

The closing dinner and dance held the last evening was as brilliant as any in recent years and the number present made a new record in attendance. During the dinner copies of

L. N. Thompson, Engr. & Supt. of Water Dept., St. Paul, Minn. Mrs. Thompson

A. O. Fabrin, chief Engr., Lane-Bowler Co., Memphis Mrs. Fabrin

Fred. E. Stuart, President, Stuatr-Brumley Corp., Baltimore Mrs. Stuart

Jas. W. Myers, Jr., Supt., Water Dept., Kenosha, Wis. Mrs. Myers

Jas. G. Griffiths, Manager, New Kensington (Pa.) Water Co. Mrs. Griffiths

Ray F. Goudey, San. Engr., Dept. of Water Supply, Los Angeles Mrs. Goudey

Wm. E. Collings, Supt., Water and Sewerage, Collingswood, N. J. Mrs. Collings

Thos. J. Blair, President, W. Va. Water Service Co., Charleston, W. Va. Mrs. Blair and Tom Jr.

G. L. Watson, Supt., Water Dept., Lake Forest, Ill. Mrs. Watson

Arthur P. Kuranz, Supt., Water Dept., Waukesha, Wis. Mrs. Kuranz

a new war song were distributed. Printed especially for the Conference, "On Your Way, U. S. A.!" proved to be a composition by no less than AWWA's premiere showman, "Bill" Orchard—for several years chairman of the General Committee on Entertainment and now chairman of the General Convention Management Committee. Interestingly enough, this song which went over with a bang at the annual dinner, was composed by Mr. Orchard while laid up with an attack of lumbago. A copy is reproduced herewith and it's worth trying on anybody's "melodian."

An innovation in entertainment consisted of "Water Warden's Night" on Tuesday night. Those attending, both women and men, were supposed to wear whatever costumes or insignia they were expected to wear in an air-raid, or in the volunteer service with which connected. A well above average floor show preceded the dancing.

In the Golf Tournament, L. C. Lenhardt of Detroit turned in the low score for Active members, with Harvey Jones of Toledo second. Chas. Berry of Kennedy Valve Co. took the honors amongst the manufacturers' representatives, and Francis Hersey was next. E. S. Gillette came in with the third low gross.

Technical Sessions Open with Panel Discussion on Administrative Problems in Wartime

The very "opening gun" of the technical sessions early Monday morning was one of the several meaty panel type discussions which ran throughout the Conference and proved so helpful to the many seeking every possible scrap of advice and information on operating and managing water works in war time.

Topic No. 1—Administrative Problems of Water Works in Wartime

H. H. Brown, Supt. of Water, Milwaukee, led off by reciting experiences wherein government agencies had been demanding main extensions beyond the corporate limits of Milwaukee. In this demand the long established policy of the Water Department in refusing extensions into suburban territory was given scant consideration. Requests to have these outlying areas annexed to the City had been given scant consideration while water service continues to be demanded for non-city taxpaying properties. Milwaukee continues to plead that something be done to avoid break-

Division Chairmen

Plant Management

G. L. Fugate, Chief Engr., Water Dept., Houston, Tex. (Retiring)

J. Clark Keith, Gen'l Mgr., Utilities Comm., Windsor, Canada (Incoming)

Finance and Accounting

Geo. F. Hughes, Manager, Water Commission, Denver, Colo. (Retiring)

W. Victor Weir, Supt., St. Louis County Water Co., University City, Mo. (Incoming)

Water Purification

Mathur M. Braidech, Prof. Chem. Eng., Case School, Cleveland, Ohio (Retiring)

Marsden C. Smith, Chief Engr., Water, Gas & Elec., Richmond, Va. (Incoming)

Walter J. Shea, Chief Engr., State Dept. Health, Providence, R. I. and Jas. V. Turner, Supt., East Providence (R. I.) Water Dept.

M. H. Phillips, Supt., Water & Sewerage, Paragould, Ark. and Jos. H. Judge, Chicago Mgr., Neptune Meters

Charlie Richardson (Providence) F. R. Georgia (Cornell) John W. Pray (Supt.) and snoozing Mayor Cadwell (Ft. Dodge, Ia.)

Kenneth C. Lauster, San. Engr., State Dept. Health, Bismarck, N.D. and Wm. P. Tarbell, City Engr., Fargo, N. D.

A. P. Kuranz, Supt., Water Dept., Waukesha, Wis. and F. P. Cunningham, Chicago (For 42 yrs. with Neptune Meter)

B. A. Poole, Chief Engr., and J. L. Quinn, Act. Chief, Ind. State Dept. of Health, Indianapolis

S. H. Thompson, Deputy Chief, J. E. Gill, Prin. Asst. Engr., Bureau of Water, Philadelphia Lloyd Nelson, U. S. Pipe Philadelphia

AWWA's Team, Victor Allen and Eric Johnson Editorial and Research Assistants to the Secretary

Wm. J. Downer, Sr. Engr., Ill. Dept. Health H. C. Burgess, Ind. Chem. Sales Div. "Herb" Hudson, Secy., Illinois Section

Jack Fugate, Chief, Engr., Houston Water Dept., and Tom Skinker, Director of Water, St. Louis, Mo.

ing the long standing policy of protecting the taxpaying public against inequitable treatment. Milwaukee is still pleading. Salary increases have been put into effect by the Water Department.

Lewis A. Geupel, Supt. at Evansville, Ind., had the experience of training employees as first class pipe maintenance and repair men only to lose them to "young expedi-

Chairmen of Cup-Winning Sections

"Hy" H. Gerstein, San. Engr., Dept. of Public Works, Chicago (For the Illinois Section received the Hill Cup for greatest membership gain)

W. P. Tarbell, City Engineer, Fargo, N. D. (To his Minnesota Section took back the Henshaw Cup for best attended meetings)

ters" offering Detroit pay rates in Kentucky. This experience led him to warn water managers to impress upon local authorities that it would be imperative to meet competition in wage scales in order to hold water works key men at any cost as the only insurance of water supply in an emergency.

Trucks and tires laid up until use proved unavoidable had been saving 400 gals. of gasoline monthly in Evansville, representing a 20 per cent reduction—not to forget the tires and other operating expenses.

Mr. Geupel feels that shorter lived pipe and materials could be used in building army camps and consign the better materials, now demanded in camp construction, to the water supply field. Mr. Geupel objected to being limited to ½" steel pipe for service lines and felt that water works should demand not less than ¾" pipe and a priority rating of not less than A-1-C. (It is to be voted that both of these wishes become fact during or shortly after the Conference—almost as if Mr. Geupel had a tip-off.)

Kenneth K. King, Director of Water, Kansas City, Mo., saw higher salaries for water utility employees as a "must." In Kansas City, with $50,000,000 in war industry, the problem was Civil Service pegged salaries and wages and until revised upward by the City the less loyal employees would continue to leave for practically double the pay received from the City. Already the turnover in office forces had been 85 per cent and in engineering and mechanical 55 per cent. Many employees remained on, in the face of temporary loss in income, out of a sense of duty or loyalty. These dependables should be given the consideration deserved. [It was apparent that boosted Water Department income would permit salary increases or wartime bonuses but such could not be done by the Department head because of Civil Service control over pay increases. Another interesting case where Civil Service proves a handicap in water utility operation.—Ed.]

Property guarding the Kansas City Water Department had added eight per cent to operating expense. The wartime personnel had added 12 per cent in numbers to the payrolls. The solution to holding employees, in the opinion of Mr. King, pointed to a curtailment of services and reduced betterment expenditures, in order to conserve income for payment of higher salaries and meeting rising operating materials costs. To his thinking, key employees should in the future be trained more efficiently and compensated commensurately.

New Directors

Thos. L. Amiss, Supt., Dept. Water and Sewerage, Shreveport, La. (Southwest Section)

I. M. Glace, Consulting Engr., Harrisburg, Pa. (Four States Section)

L. G. Lenhardt, General Manager, Dept. of Water, Detroit, reported on the problems of a 500,000 population increase. He reviewed the situation in which water service was being demanded for a Government

H. G. Hortsmann, Supt. of Operations, Public Service Co. Ind.

F. A. Schaefer, Supt., Gas & Water Utilities, New Albany, Ind.

A couple of "Alkali Bills," W. E. (Bill) Phillips, J. W. (Bill) Fenger, Mathieson Alkali Wks. Chicago and Buffalo

Both Filtration Supts. J. W. McCoy, Madisonville, Ky., and Earl T. Mitchell, Paducah, Ky.

John Harrington, Ch. Engr., W. Va., Dept. of Health (W. Va. Section Secy. and Director) C. C. MacDonald, Secy., W. Va. Water Ser. Co., Charleston, W. Va.

Morris S. Jones, Chief Engr., Pasadena Water Dept. (Calif. Sec. Chairman)

Frank Brooks, Pres., Art Concrete Works, Pasadena, Calif.

(1) *Milo E. Smith, Manager Publicity, Chicago Bridge & Iron Co., Chicago.* (2) *Herbert S. Grove, General Manager, Board of Water Commissioners, Stillwater, Minn.* (3) *Jim S. Ten Eyck of Rochester, N. Y., Rensselaer Valve Co., Troy, N. Y.* (4) *Leonard N. Thompson, Gen. Supt. and Engr., Water Dept. of St. Paul, Minn.* (5) *C. A. Scott, Gen. Sales Manager, American Well Works, Aurora, Ill.* (6) *"Dave" L. Erickson, City Engr. and Director, Dept. Public Properties, Lincoln, Nebr.* (7) *E. Scranton Gillette, Gen. Manager and Vice-Pres., Gillette Publications, Chicago.* (8) *"Dave" Crenshaw, Chairman, Water Board of Des Moines, Ia.*

housing development 18 miles beyond the city limits of Detroit, while thousands of vacant lots existed in Detroit and fringe territory. These lots already having utilities facilities in the street. Utility extensions were being demanded at financial sacrifice while other projects badly needed had to be pigeonholed. Mr. Lenhardt mentioned three projects being financed through F.W.A. at a cost of better than

Thos. F. Wolfe, Research Engr., Cast Iron Pipe Research Assn., Chicago (Chairman of the Golf Committee)

Leslie A. Jackson, General Manager, Water Dept. of Little Rock, Ark. (As vice-chairman of Southwest Section, was busy making arrangements for October meeting in Little Rock)

Courtland M. Mosier, Manager and Supt., Spring Valley (N. Y.) Water Co. (For 41 years has served his company)

$7,000,000. On two of these trunk main projects (representing $3,700,000) priorities had been granted. The third ($2,400,000) was waiting for a rating and the "green light." The fourth would involve almost doubling the Springwells Filtration Plant.

H. S. Morse, V.P. and Gen. Mgr., Indianapolis Water Co., referred to the "Three Ps of Wartime Problems" as consisting of Personnel, Priorities and Pipelines. He commented that the chief job confronting most of us is that of learning how to adjust ourselves to doing with less. In this direction, Indianapolis Water Co. has learned that the use of bicycles in place of cars has been saving time as well as materials.

In regards "Personnel," Indianapolis Water Co. had suffered employee losses to the service, but many more to industry. Still operating with reduced force on the 40 hour work week there had been substitutions of women for men wherever permissible. Certainly there would have to be less customer service for the duration and quarterly meter reading seemed a probability, with monthly billings continued on an estimate basis to prevent the appearance of a three months' billing at one time and make payments easier.

Taking up "Pipe-lines," this had been a real problem, involving a forced expenditure of $300,000 to serve outlying industries. A survey had revealed 15,000 vacant lots in Indianapolis and environs which had water mains and services in the streets. As a result 78 per cent of the new housing in Indianapolis had been placed on those lots for which utility service was already available.

Concerning "Priorities," Mr. Morse stated that there had been nothing of any serious setback in this quarter. For their cooperative interest and assistance he praised the manufacturers of water works equipment in making good deliveries.

Mr. Morse added a fourth "P"—Politics—saying that less political maneuvering would be very helpful while attending to the other "Ps." He commented on the increasing attitude of "take-it-or-leave-it" in all directions, and thought that now would be the psychological time to win customer good will for years ahead by giving extra attention to this group in this period. [Incidentally, Mr. Morse's company pays out $915,000 annually in taxes.—Ed.]

In the floor questions and discussion which followed the panel discussion, E. T. Cranch, Mgr., New Rochelle (N. Y.) Water Co., asked for experience in getting deferment from the draft for key employees.

President Howson referred Mr. Cranch to the list of essential water works employees, showing the length of training required for replacements. This list, prepared by Secretary Jordan, had been distributed to local Draft Boards for their guidance in issuing deferments.

Warren A. Gentner, Deputy Chief Engr. and Manager, Water Bureau of Hartford, Conn., stated that he had recently filled out a 4-page form for the Hartford Draft Board covering a key employee. He found the listings of deferrable employees contained the A.W.W.A. classification.

G. Webber Knight, Mgr., Natrona (Pa.) Water Co., stated that the

Directors

N. T. (Tom) Veatch, Black & Veatch, Engrs., Kansas City, Mo.

Jim H. Kennon, Engr. and Manager, Water Bureau, Pittsburgh, Pa.

George J. Rohan, Supt. and Engr., Water Works Commission, Waco, Texas (Retiring Southwest Section Director)

form to request is DSS form No. 42a which should be filled out and filed *before* the employee is called. So far no refusal of deferment had been experienced. [Since the Conference facsimiles of DSS Form 42a have been supplied every member of A.W.W.A. along with the listing of titles considered as "Critical Occupations, Scientific and Specialized Personnel."—Ed.]

Chas. C. Casad, City Engr. and Supt. of Water, Bremerton, Wash.—the home of the Pacific Fleet—related experiences of losing $150 meter readers to the Navy Yard, paying $500 per month. Neither did he like the idea of the O.C.D. turning his water crews into firemen. Guarding properties cost them only $3,000 per year, old men being used.

"The War and Water Rates," by Reeves Newsom, Consulting Engr., New York City.

Mr. Newsom, during the last World War a manager of an important chain of water works properties, stated that 67 rate increases

(1) *Earl A. Smith, Michigan Representative, Badger Meter Co., Milwaukee, Wis.* (2) *Max Grossman, Asst. Supt., Water Department, Atlantic City, N. J.* (3) *Thos. J. Eaton, Supt., Bureau of Water, Amsterdam, N. Y.* (4) *Scotland P. Hyland, General Mgr., Water Board of Clarksburg, W. Va.* (5) *A. W. Ross, Vice-President, Layne-N. Y. Co., N. Y. City.* (6) *Wm. D. Hurst, Water Engineer, City of Winnipeg, Canada.* (7) *Melvin P. Hatcher, Chief Engineer and Supt., Dept. of Water, Kansas City, Mo.* (8) *Milton Towne, C. I. Pipe Accounts Executive, Richards, Alley & Richards, Advertising, New York City.*

were granted water utility companies and departments in 1919, averaging a 10 per cent increase on net revenues. However, increased operating and maintenance costs had more than wiped out the added profits. So far in this war no increases in rates had been granted and the industrial expansion had added revenue which more than covered increased operating costs. If rate increases are asked for later high taxes will be the greatest hurdle.

Priorities are adding costs to operation, maintenance and repair, but has served the useful purpose of avoiding the making of unprofitable main extensions.

Mr. Newsom explained the method of financing new projects under the Lanham Act in which there was the alternate choice of construction under the Federal Grant in Aide system or Federal financing in toto, in which case the Government became the owner and leased the property to the municipal authority for operation without profit. In the case of private companies no Federal aid was available but rates have been allowed which amortize main extensions over a five-year period.

As to the matter of wage increases to water works employees, L. H. Enslow commented on the Canadian Wage Control System which gives all public employees, as well as all others in the lower income brackets, an automatic wage increase at every 5-point climb of the general living cost index. [In this issue is an article, written by Ross Dobbin of Peterboro, Canada, at our request, which describes the workings of the Canadian Wage Control Act as it relates to water works operation in particular. Since a simliar Act is expected for this country, Mr. Dobbin's article makes timely reading. A follow-up article by the same author will describe Canadian wartime control of utilities rates as well as prices in general.—Ed.]

President Howson, in commenting on what may be ahead in regards prices of water works materials, pointed out that in World War I prices for construction and materials never did return to the pre-war base closer than a 50 per cent recession of from the peaks. Also, the fact that the peaks in prices came along about 18 months after the war was over, is something to consider.

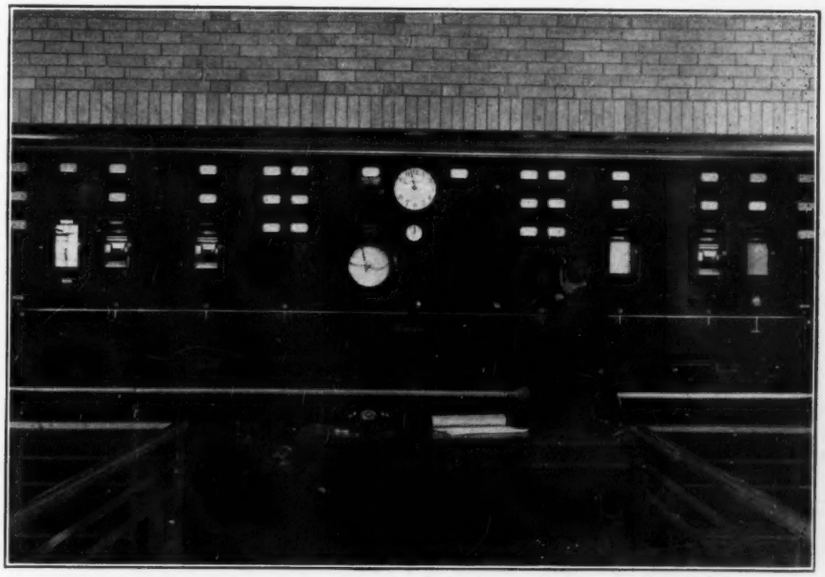
(To be continued)

Henry Nunn On Duty with U.S. Engineers

Henry E. Nunn

Henry E. Nunn, Superintendent of Water at Van Buren, Ark., has been granted leave of absence for the duration to serve with the U. S. Army Engineers. His present service is at a large ordnance plant "somewhere in the USA." For reasons of censorship we do not name the location but Mr. Nunn can be reached through Van Buren, of course.

While on leave Mr. Fay Peer is Acting Superintendent in Mr. Nunn's place—and reading W. W. & S. regularly because Mr. Nunn has placed a second subscription which will follow him around while on duty with the U. S. Engineers.



Toledo's Remote Control Board with Illuminated Piping Diagram.
The above picture is of the Westinghouse Remote Control Board in the new Low Service Pumping Station of Toledo, Ohio. The feature of greatest interest, and added value, at the control center is the bench-board with its illuminated piping diagram. This diagram reveals at a glance the actual path of water flowing through the respective mains and the positions of all of the valves operated through the central control board.

A SIMPLE SOLUTION FEEDER FOR SMALL FLOWS

By E. E. WOLFE
Supt. of Filtration
HANNIBAL, MO.

MOST treatment plants have occasion to set up small solution feeders for experimental or temporary use. For such purposes the feeder here described has been used by the author with marked success for feeding solutions of ammonium sulfate and copper sulfate. Its ease of construction and trouble-free operation make it useful as a more or less permanent piece of equipment.

The Apparatus

A large stoneware jar of 20 gallons capacity is used to make up a constant strength solution. By means of a syphon made up of ½ inch pipe, this solution flows to another stoneware jar of 2 gallons capacity, which acts as a constant head tank. To maintain a constant head, a small float valve is attached to the outlet end of the syphon. The float valve used is of the type commonly found within the body of a vacuum condensate air venting trap. The cone-shaped needle valve and seat furnishes close regulation of the flow for small changes in the position of the float ball, which in itself measures only about 2½ inches in diameter. The length of the long arm of the syphon will, of course, determine the head carried in the small jar. A satisfactory head or depth of solution is 7 or 8 inches.

To obtain an outlet for the small jar, a hole must be drilled either in the bottom or in the side, close to the bottom. Drilling through the bottom is easier because of the absence of surface glaze, but a bottom outlet may interfere with the resting of the jar on its pedestal. Side drilling is not difficult once the glaze is broken through. This may be accomplished by gentle manipulation with a sharp ¼ inch diamond point or round nose chisel, chipping away the glaze from an area roughly equal to the size of the hole to be drilled. Drilling is accomplished by using an ordinary steel drill held in a wood brace or a breast drill, turning slowly and exerting only moderate pressure against the jar. For an outlet of ¼ inch pipe a ⅝ inch hole may be drilled. The outlet pipe is fastened to the jar by threading sufficiently to take soft rubber gaskets, washers and lock nuts, both inside and out.

Feed Regulation

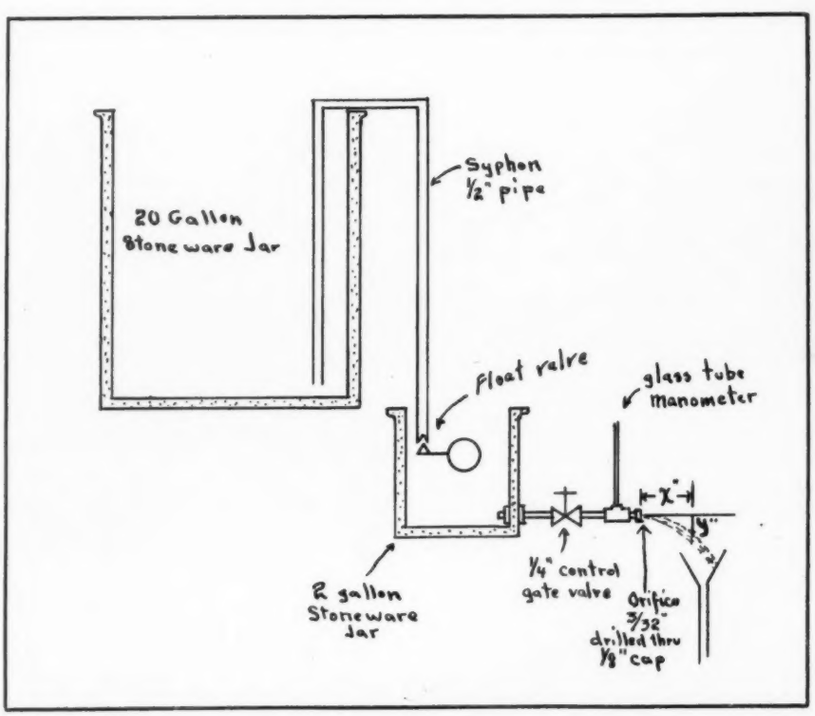
To control the flow, an ordinary ¼ inch gate valve may be used. Beyond the valve a short nipple is inserted to smooth the flow, and finally the nipple is closed with a cap through which a small orifice is drilled. The author prefers an orifice no larger than three-thirty seconds of an inch.

Regulation of the feed may be obtained in several ways. Where there is no need for frequent changes in quantities of chemicals fed, the valve may be set for such a flow as will empty the 20 gallon tank in a selected number of hours. This setting is obtained by actually measuring the flow for a definite interval of time, say one minute. Thus with a constant flow the strength of the solution can be changed if desired each time the jar is filled.

Where frequent changes in chemical dosages are needed, these may be accomplished by manipulation of the control valve and measuring the flow through the orifice by any convenient method. One such method depends upon the variation of curvature of the horizontally projected stream. This method suggested itself to the author by an article contributed by W. F. Schaphorst and published in WATER WORKS AND SEWERAGE, September, 1941.

A still simpler method of measuring the flow from the orifice involves the use of a manometer tube. A Tee fitting is inserted between the control valve and the orifice with the side connection of the Tee facing upward. A small rubber one-hole stopper and glass tube (preferably a graduated pipette or burette) makes the manometer; the liquid inside this tube will rise to a height corresponding to the flow through the orifice.

Both of these methods of control and measurement depend on the variation of head at the orifice, which is fixed in size. The advantage of this type of flow control for very small streams lies in the use of an easily constructed fixed orifice.



THIS WILL *Always* BE!

Wonder of the Western World—Niagara Falls has been called. And not by accident but apparently by design is it located here in America. Its thunder is the thunder of a people who have strength and happiness in freedom. Its movement is the restless, surging movement of men who feel a deep compulsion to go forward in history. Its power is resistless—and cannot be stemmed.

Those pioneers who first glimpsed the stately grandeur of Niagara saw in its rainbow the promise of a new world where peace and opportunity could be found. The rainbow is still there, and the peace and opportunity which America has given to millions are treasured beyond price. In a world where freedom is being crushed, Niagara symbolizes everything which this country means—strength, abundance, steadfastness. It is a limitless fountainhead of power which can be transformed into energy that brings good to all.

We who work within sight and sound of Niagara Falls are devoting every ounce of our energies and facilities to speeding the flow of Chemicals for Victory.

CAUSTIC POTASH · CAUSTIC SODA
PARA · CARBONATE OF POTASH
LIQUID CHLORINE

FROM THE ORIGINAL BY ADOLF DEHN . . . IN NIAGARA ALKALI COMPANY'S COLLECTION OF PAINTINGS OF NIAGARA FALLS

NIAGARA ALKALI COMPANY

EBG *Niagara* **ALKALI COMPANY**

60 EAST 42nd STREET, NEW YORK, N. Y.

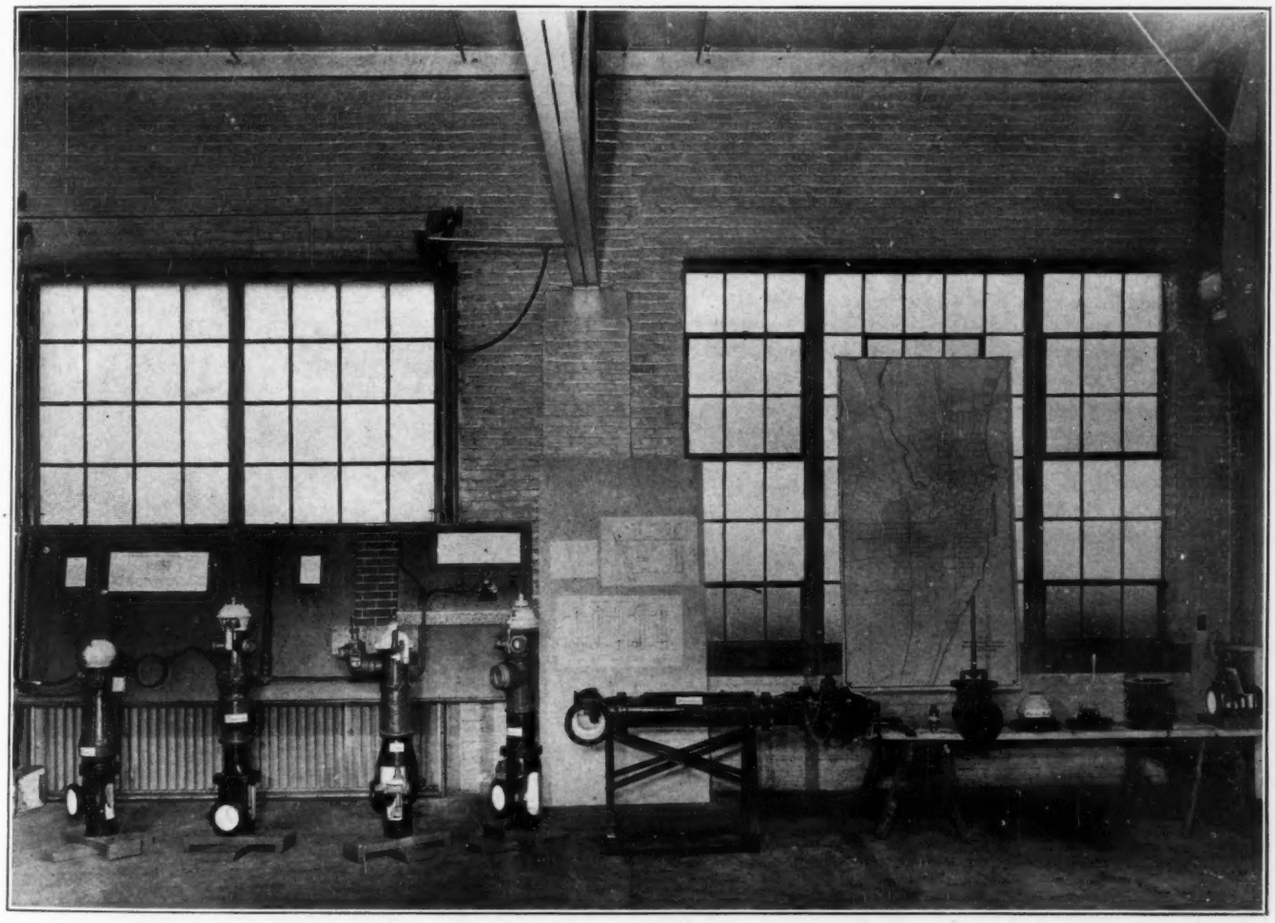
AN EXPERIENCE IN CIVILIAN DEFENSE TRAINING

By WALTER A. PEIRCE, Manager
Racine Water Department
Racine, Wisc.

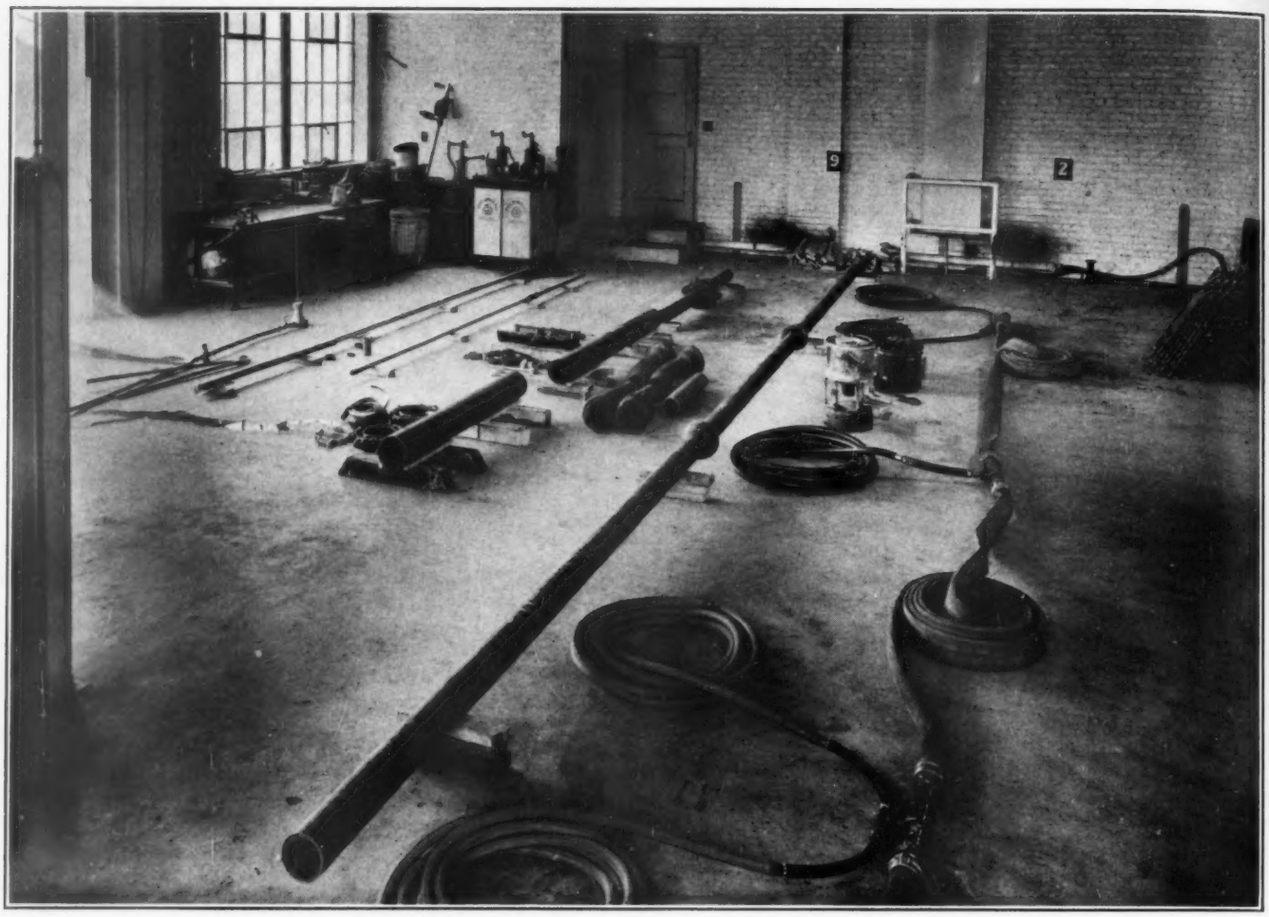
OVER the past few years at Racine we have been accumulating damaged hydrants of the various types installed in our system, with the idea of preparing cut away exhibits of them to use in the training of maintenance and repair men, and enlightenment of members of the Racine Fire Department.

In the meantime, Civilian Defense has come to the front and the first use made of these instruction models, which have just been completed, was in the training of some forty-five rescue workers. The setup, as here pictured, shows Coffin, Chapman, Eddy, Ludlow, Waterous and Racine Standard hydrants and a distribution valve. There is also a large chart showing the essential features of a water service, according to Racine practice. On the chart in the center of the picture there are simple drawings of sections of the different types of valves and hydrants and also a set of Atlas maps, copies of which are carried in all service trucks. A large map of the distribution system was also effectively used in

The Author



Hydrant and Valve Demonstration with Cutaway Units
From left: Coffin, Chapman, Eddy, Ludlow, Waterous (on side) and Racine-Standard Hydrants.



Equipment Layout for Demonstrations and Instruction in Emergency Service and Repairs.

conducting the class.

A second picture shows a setup with which we demonstrated emergency service and emergency repairs.

The hose line with the branches we have used for a number of years to give temporary service to buildings along any street which had to be temporarily shut off. We demonstrated the method of detour around the bomb crater by means of 45° bends and the pipe line shown in the center of the picture. We also demonstrated the use of three types of mechanical couplings on 6-inch pipe and also two smaller ones.

In the left center of the picture is shown a leaking lead service and the tongs by which we pinch the pipe together to stop the flow until permanent repairs can be made.

The demonstrations, requiring two hours, were very favorably commented on by the authorities.

Availability of Wiping-Solders Assured

An amendment to Tin Conservation Order M-43-a, issued August 3, 1942, permits the manufacture and use of wiping solder containing 38 per cent tin by weight for the installation and repair of lead water service pipes. The extension is granted to January 1, 1943. Since lead is at the present the most available of the flexible service pipe materials, this amendment removes a material threat to the continued use of lead for this purpose, and solves one more wartime problem in connection with water distribution.

"Slightly Used"

This "slightly used" meter was exhibited by the Milwaukee Water Department in A. W. W. A.'s "Antique Show" staged in Chicago during the Conference on Wartime Water Works Problems.

The record accompanying this antique ⅝-inch Trident revealed that it had seen continuous service for 46 years (installed May, 1896, removed February 1942) until it was shopped because of failure to register on a small stream. Far from being through, however, this "cash register" of 46 years was overhauled, adjusted for accurate registration and approved for service.

THE ROLE OF CHEMICALS IN INDUSTRIAL WASTE TREATMENT*

By E. F. ELDRIDGE
Associate Engineer
MICHIGAN ENGINEERING EXPERIMENT STATION
EAST LANSING, MICH.

IN PREVIOUS papers of this series, which have been appearing in WATER WORKS AND SEWERAGE, the author discussed two distinct treatment processes for industrial wastes. The first involved the "Oxidized Sludge Process," as conceived by E. B. Mallory. The second consisted of a discussion of the application of the principle of recirculation to standard biological filtration.

In this paper a third process will be briefly outlined; namely, that of treatment with chemicals. This topic obviously covers a wide field and it will not be possible to touch upon all of the applications of chemical treatment to industrial wastes nor to give a detailed discussion of these applications. The more important chemicals used for this purpose will be listed and some of the major applications will be discussed.

The characteristics of the liquid wastes from industries vary over a wide range, as do many of the operations of these industries. These variations influence the type of treatment adaptable to the particular waste. For instance, an organic waste may respond to some form of biological treatment, but because of the high concentration of the waste material or because of seasonal factory operations, this type of treatment may not be feasible.

Where Chemical Treatment Fits

Certain characteristics or combinations of conditions often make the selection of chemical treatment feasible or even necessary as a part, at least, of treatment processes applied to industrial wastes. Some of the more important factors involved and circumstances to consider are as follows:

(1) A number of industries, such as the beet-sugar and most canning industries, operate seasonally for relatively short periods. Since biological processes require time for the development of a biological flora, while chemical coagulation is immediately effective, the selection of chemical treatment processes appears to be the more feasible for wastes discharged from industry under these conditions.

The Author

(2) In some cases, the waste material is largely in true or colloidal suspension. Chemical coagulation may be used as an aid or adjunct to the sedimentation of such suspended matter. The process may constitute the sole treatment or may be followed by some biological process, depending upon the nature of the waste and the degree of removal desired.

(3) Chemical processes usually produce results that are lower down the scale than those obtained with biological processes. For instance, chemicals do not remove any of the soluble materials in the waste. However, the construction and operating costs of plants providing chemical treatment are often less than those for biological works, and when stream conditions permit chemical treatment may be selected.

(4) Chemical processes are much better understood by industrial managements and usually are given more intelligent attention than are given to the biological processes, which industry considers more complicated.

(5) Chemical processes do not normally require the exacting operating conditions usually considered necessary for the proper functioning of biological processes.

(6) Chemical treatment may be required in cases where toxic substances contained in the wastes interfere with biological activity.

(7) Inert or inorganic materials may be precipitated from a waste by chemicals.

Chemicals Used and the Principles of Coagulation

The following is a list of the main chemicals used in the chemical treatment of industrial wastes: Lime, alum, ferric chloride, ferric sulphate,

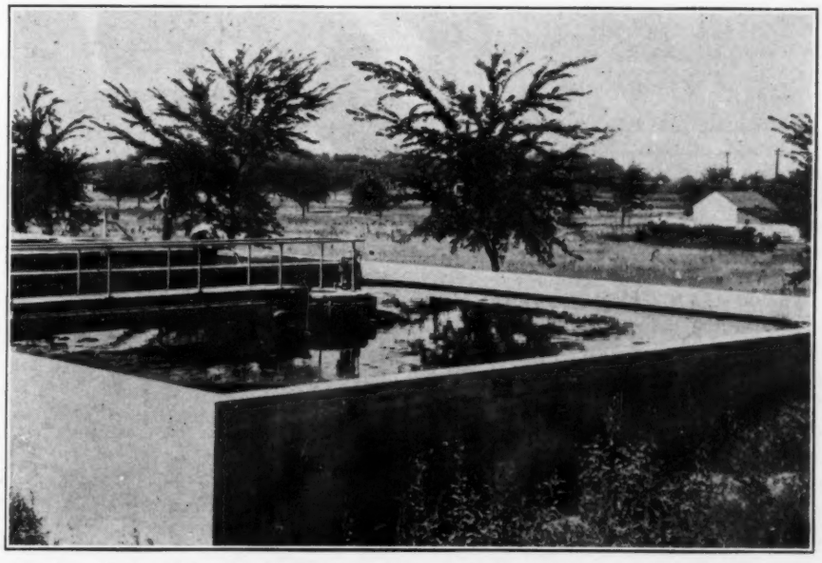


Fig. 1—One of the Dorr Clarifiers of the Waste Treatment and Recovery Plant of the Monroe Paper Products Co., Monroe, Mich.

*One of a series of articles by Mr. Eldridge, author of the recently published 389-page text "Industrial Waste Treatment Practice"—a review of which appeared in our July issue.

ferrous sulphate (copperas), chlorinated copperas, and chlorine. Others, such as bentonite, zinc chloride, sulphuric acid, etc., have been applied in special cases.

As has been stated before, chemical coagulation is usually employed as an aid to sedimentation for the effective removal of non-settling suspended and colloidal material. Coagulants are compounds which when added to water combine with natural or added alkalinity to produce carbonates, basic oxides or hydroxides. These reaction products are produced in the form of precipitates which agglomerate into heavy flocculant masses. The removal of colloidal and finely divided suspended matter by these "floc" particles results from a combination of electrical and physical reactions. Colloidal particles contained in industrial wastes usually carry negative electrical charges. These charges are neutralized by the positively charged coagulant particles causing them to adhere to the floc and be carried down with the particles as they settle from the liquid phase.

Effective coagulation depends upon the following factors:

(1) The selection of the proper coagulant or combination of coagulants.

(2) The application of the optimum quantity.

(3) The presence of natural or added alkalinity in sufficient amount to react with the coagulant.

(4) Regulation of the pH.

(5) Rapid mixing of chemical and waste.

(6) Provision for a period of slow stirring (flocculation) during which time the particles are developed to their maximum size and settleability.

Applications in Waste Treatment

Chemicals have been used in the treatment of most industrial wastes at some time or other in the past. However, in many of these cases, the treatment has proven neither effective nor practical. The following is a list of wastes to which the application of the process appears to be feasible, either because of the nature of the waste or conditions under which it is produced, or for economical considerations. (This is by no means a complete list.)

Cannery wastes
Paper-mill wastes
Beet-sugar-factory wastes
Textile wastes
Slaughter-house wastes
Laundry wastes
Metal-industry wastes

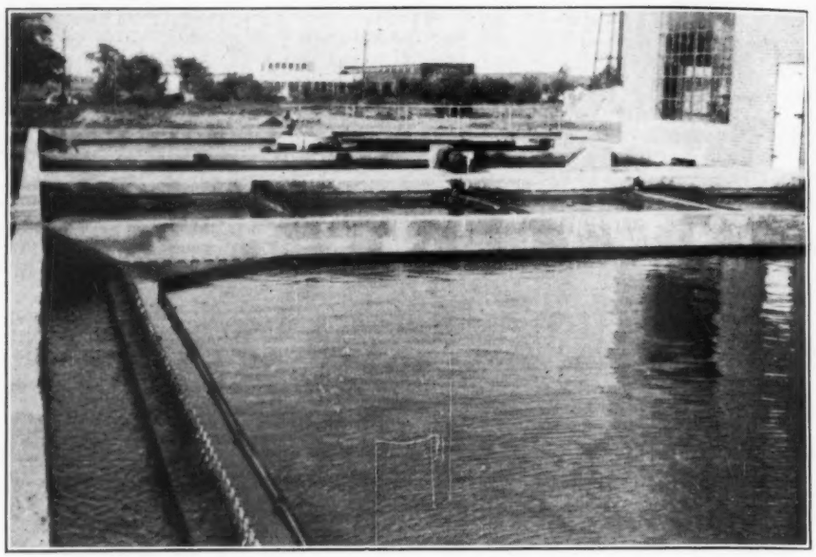


Fig. 2—Waste Treatment and Recovery Plant of the Monroe Paper Products Co.

Across one of the Clarifiers can be seen the "Flocculators" and the second Clarifier.

Cannery Wastes

The canning industry may be divided into two general groups, namely, (1) those "full-line" factories that produce a wide variety of products and (2) the "specialized" canneries producing but one or two products. Canneries operating on but one or two products, such as peas, corn, tomatoes, etc., have comparatively short seasons. Chemical treatment is especially adapted to the wastes from these factories, since time is not available for the development of the biological growths required for biological processes.

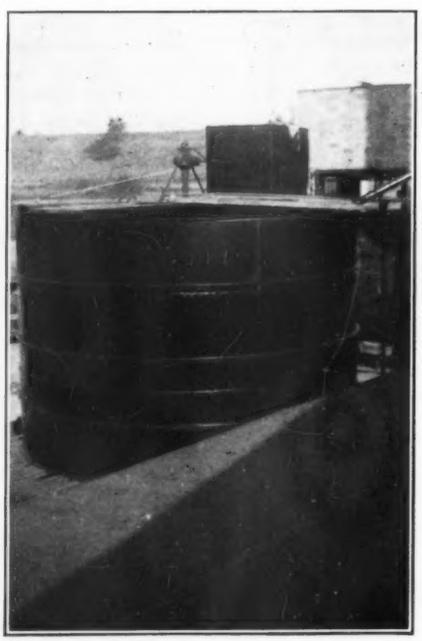


Fig. 3—Typical Small Chemical Precipitation Plant Treating Meat Packing Plant Wastes. Grand Rapids Packing Co., Grand Rapids, Mich.

Full-line canneries generally have longer seasons and more time is available for this biological development. Wastes from full-line canneries may contain a high concentration of suspended solids in which case chemical coagulation and sedimentation may precede the biological process. Consequently the treatment of full-line cannery wastes may include some form of biological treatment, while that of wastes from specialized canneries seldom goes beyond the chemical processes.

Chemical treatment may be accompanied by either of two principles of sedimentation, fill-and-draw, or continuous-flow. The former has been adopted by the National Canners' Association and has been employed for a number of years at canneries in Wisconsin.[1] Fill-and-draw sedimentation is especially adapted to wastes from specialized factories where volumes are relatively small. If flows exceed 4000 to 5000 gallons per hour, such as is often the case in full-line canneries, the continuous-flow principle is the more practical.

In either case provision is made for the addition of the chemicals, rapid mixing, a 15-to-20-minute flocculation period, and a 2 hour minimum settling period. Sludge is removed to drying beds of stand-

[1]Warrick, L. F., F. J. McKee, H. E. Wirth, and N. H. Sanborn: "Methods of Treating Cannery Wastes," National Canners' Association Bulletin 28 L (1939).

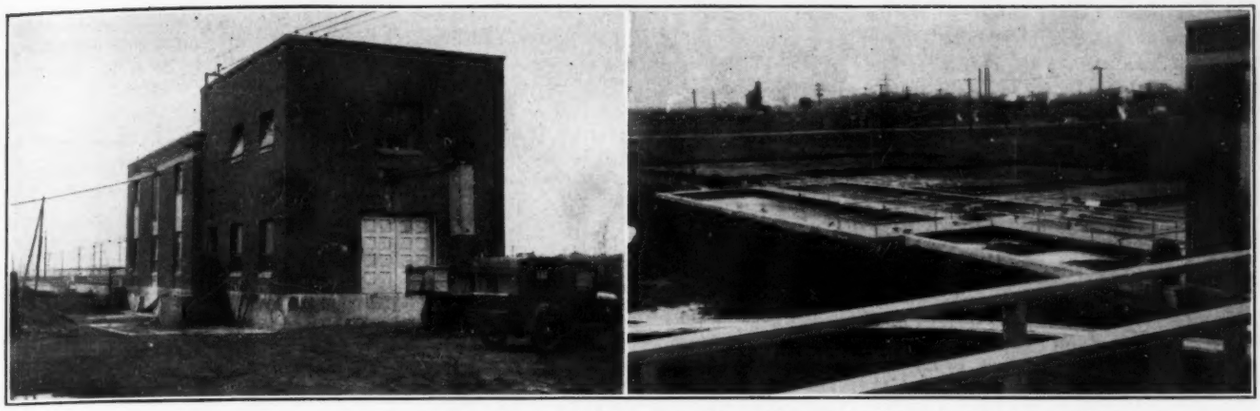


Fig. 4—Portions of the Waste Treatment Plant of the Oscar Mayer Packing Co., Madison, Wisc.
On the right, the coagulating and settling tanks viewed from the bridge of the sludge concentration tank, shown in another picture. On the left, the chemical and vacuum filter house.

ard design. About 7 days is required for the drying of precipitated sludge during good drying weather.

Lime is the principal coagulant used for the chemical treatment of cannery wastes. Other chemicals, such as ferrous sulphate, alum, ferric chloride and sulphate, and zinc chloride may be required to augment the effect of lime. In some cases these other coagulants are not necessary, but often they aid materially in coagulating and settling the suspended matter.

Cannery wastes contain considerable dissolved material that is not removed by chemical treatment. Table 1 shows the chemical applications required and the resulting B.O.D. removals. Wisconsin studies have indicated zinc chloride to be superior to other coagulants, but because of its cost its use is obviously impractical. Ferrous sulphate seems to be next in effectiveness.

Paper Mill Wastes

There are two distinct processes in the manufacture of paper, (1) the preparation of the pulp for paper manufacture and (2) the production of the paper. The wastes from the latter operation are herein considered as paper-mill wastes. This waste is composed largely of so-called "white water" from the paper machines.

Although there are many types of paper, each producing "white water" of different characteristics, yet in most instances this so-called white water may be effectively clarified by chemical coagulation. The material that is removed by the treatment is often of such a nature that it can be returned to the mill and reused. This is more often true in the case of board mills than it is in bond or writing paper mills producing a high grade paper.

Most of the usual coagulants are effective, however, when the product is reused, alum is the more desirable. Alum is used in paper manufacture and its presence in the returned material in many cases is desirable rather than detrimental. Iron salts are not desirable in paper production except in the case of highly colored low grade board. Lime is not required as an aid to coagulation when natural alkalinity is sufficient.

The removal of the coagulated material from the white water may be accomplished either by flotation or sedimentation. Flotation savealls, of which the ADKA of the Dorr Co. is an example, are often employed since they work into the mill processes to a somewhat better advantage than do sedimentation tanks.

The quantity of chemical required for efficient coagulation varies, depending upon the type of white water. Book and high-grade-board-mill white water require from 0.2 to 0.4 pounds of alum per 1000 gallons. One installation on a low grade board paper required up to 1 pound of alum per 1000 gallons.

An outstanding example of a full-scale installation is that of the Monroe Paper Products Co. at Monroe, Mich. This plant was constructed by the Dorr Co. and consists of two sets of flash mixers, coagulation tanks, and settling tanks. Fig. 1 shows one of the clarifiers. Fig. 2 is a view showing one settling tank in the foreground and the "Flocculator" (coagulation tank) immediately beyond.

This installation has resulted in the return of from 7 to 9 tons of material to the process daily.

Beet Sugar Factory Wastes

There are two distinct wastes produced by the "straight-house"

TABLE 1
COAGULANTS FOR CHEMICAL TREATMENT OF CANNERY WASTES

Waste	Lime lbs. per 1,000 gal.	Second Chemical Name	Second Chemical lbs. per 1,000 gal.	B.O.D. reduction per cent
Pea	7	Ferrous sulphate	3	47
	7	Alum	3	45
	7	Ferric chloride	1 to 3	39
	7	Ferric sulphate	1 to 3	33
	6	Zinc chloride	2	75
Beet	8	None	..	43
	8	Alum	4	36
	10	Ferrous sulphate	4	45
	10	Ferric chloride	2	38
	10	Zinc chloride	10	85
Corn	9	Ferrous sulphate	8	70
	8	Ferric chloride	3	57
	6	Zinc chloride	2	73
Tomato	8	None	..	49
	4	Alum	1	54
Carrot	8	None	..	..

beet sugar factory, namely, flume water and process water. Flume water is produced as a result of the fluming and washing of the beets. Process water is a combination of wash water from the diffusion batteries and press water from the pressing of the spent pulp.

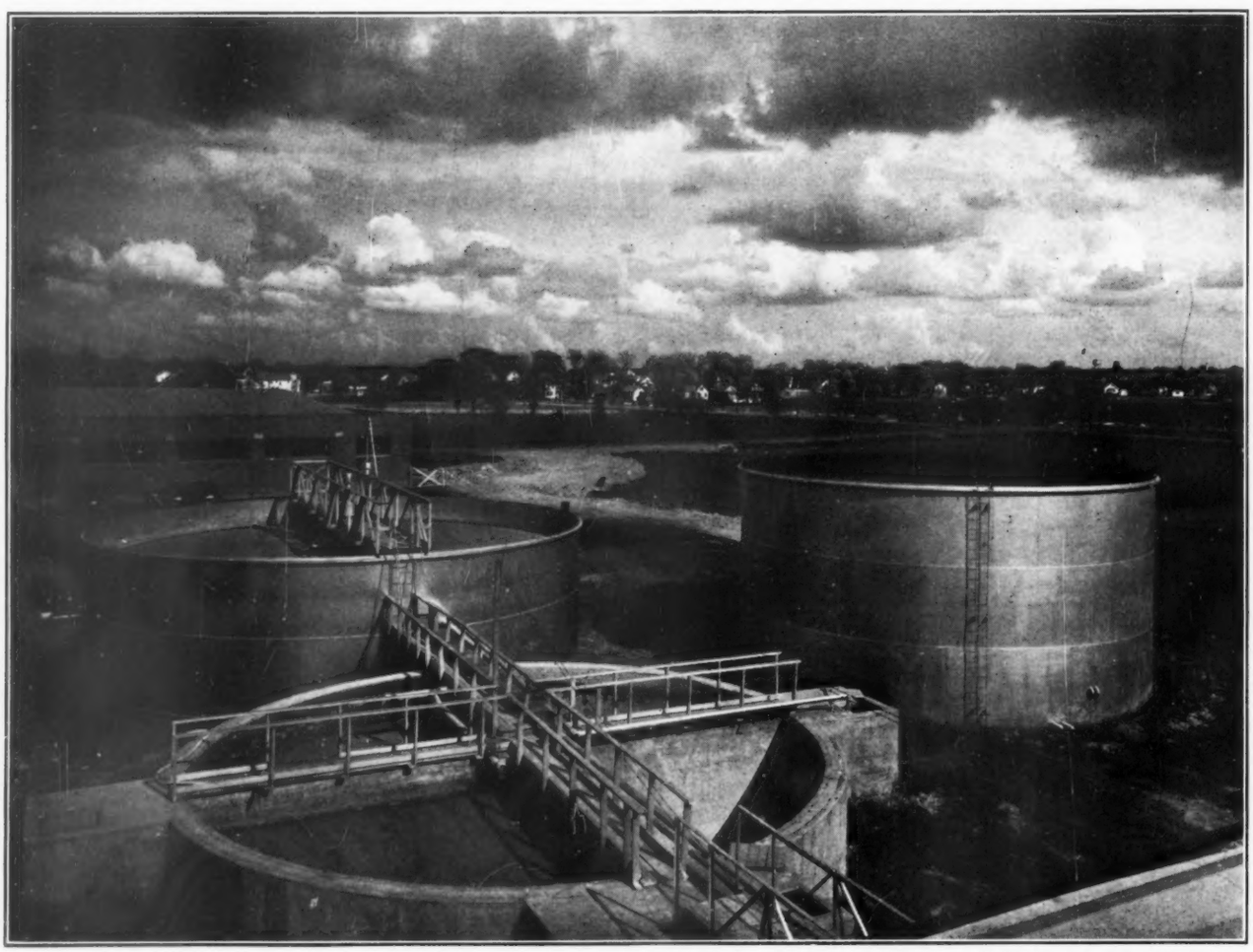
Usually no attempt is made to treat flume water other than by plain sedimentation. Process water, however, contains a considerable quantity of colloidal and finely-divided suspended matter. This material can be effectively removed by coagulation.

Lime is used as a coagulant. From 500 to 600 p.p.m. (4.2 to 5.0 pounds per 1000 gallons) of CaO produces a water-clear effluent when properly applied. Lime may be applied as dry lime or milk of lime. It must be rapidly mixed with the waste by means of a flash mixer or mixing trough. The coagulation and settling tanks should have detention periods of 20 and 120 minutes respectively. Sludge is ponded in lagoons or filtered on the vacuum. Suspended solids removal averages 93 per cent and B. O.D. removal 47 per cent.

Textile Wastes

Wastes in the textile industry are produced from numerous operations depending upon the type of products. The major application of chemical coagulation is to the general factory wastes which include wastes from the cleaning of the raw product (deterging), bleaching, preparation of cloth and dyeing and printing. In some cases, however, certain of these individual wastes must undergo some form of preconditioning before they mix with the general factory wastes. Deterging wastes in particular are extremely concentrated and contain fat, grease, gum, etc., in such quantities that recovery of these materials should be feasible. Even in those cases in which these materials are not recovered for use, it is necessary to remove them from the concentrated wastes before they are treated with the general wastes. Acid and alkali wastes must be mixed to produce a more neutral waste and bleach and dye wastes mixed to assist in the decolorizing of the dye. It is not within the scope of this paper to describe these operations.

The general waste is of such a nature that biological processes are not adapted to its treatment. Chemical coagulation is usually applied using either the fill-and-draw or continuous-flow system. Since many of the operations of the mill are intermittent some provision must be made for equalizing the waste prior to the application of the coagulants. An equalizing tank is employed with the continuous-flow plant for that purpose. This tank should have a capacity for 3-hour maximum flow of waste. The detention period of the coagulation and settling tanks should be 20 and 90 minutes respec-



(Photo by Courtesy Chicago Bridge and Iron Co.)

Fig. 5—The Waste Holding and Equalizing Tank and Sludge Concentration and Holding Tanks of the Oscar Mayer Packing Co., Madison, Wisc.

The sludge concentration tank beyond the concrete sludge holding tank is equipped with a Chain Belt "Tow-Bro" thickening and collecting mechanism.

tively. Fill-and-draw tanks act as equalizing tanks as well as combination coagulation and settling tanks.

Lime is the most commonly used coagulant. In many cases it is possible to use lime without the addition of other chemicals. This is especially true if the wastes do not contain a large proportion of soapy detergent wastes. These soaps tend to make the precipitated floc light, and much of it will float rather than settle. The average quantity of lime required is about 4 pounds per 1000 gallons. High-calcium lime is most satisfactory.

Alum, ferrous sulphate and ferric chloride and sulphate are the more common coagulants used in combination with lime when a second chemical is necessary. The average requirements are about 1 pound of chemical per 1000 gallons of waste. The selection of the coagulant and the determination of dosage requirements must be made by a study of the waste to be treated. Sludge is lagooned or dried on the vacuum filter.

Slaughter-House Wastes

The operations of the slaughter house consist of the killing, bleeding and butchering of animal. Several types of wastes are produced of which the drainage from the stockyard and the washings from the killing floor are of major importance. These wastes contain excreta, manure, blood, grease and dirt.

In most cases biological processes have been utilized for the removal of this waste material. However, some plants have been designed for chemical treatment, particularly of the killing floor wastes. Originally this method of chemical treatment was used for the recovery of blood protein. Small plants in which operations are intermittent require a treatment process which is effective for intermittent waste discharge. Chemical treatment is more adapted to this condition than most biological processes, hence the process has been adapted to the wastes from small houses.

The principal precipitating agent in this process is chlorine. Sedimentation of the precipitated material may be assisted by the application of ferric chloride. Chlorine has the property of coagulating certain blood proteins contained in the killing floor washings. The wastes are collected in a wood stave or metal tank. (The metal tank must be protected by an asphaltic covering.) The tank is provided with a stirring mechanism. Chlorine gas is applied

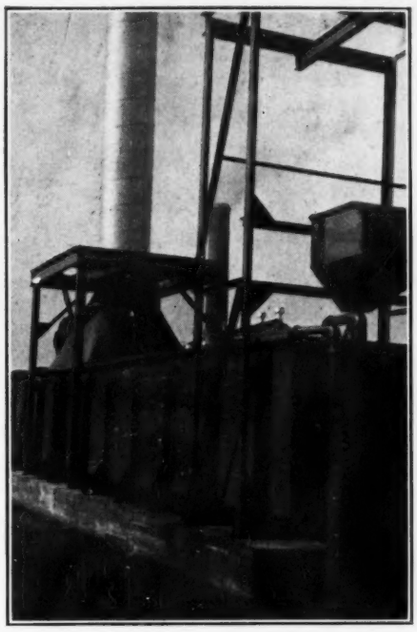


Fig. 6—Plant Treating Metal Plating Wastes Containing the Deadly Cyanide Bath Waste. Chevrolet Motor Co., Flint, Michigan.

from cylinders through diffusers or perforated rubber pipe. The application is continued until the liquor above the solids upon settling is a light tan color. This requires an excess of about 50 p.p.m. of chlorine over that demanded by the waste. After precipitation is complete 1.5 pounds of ferric chloride per 1000 gallons is added and stirring continued for about 20 minutes. The solids are allowed to settle and are drawn to beds or to a digestion tank.

Superchlorination does not constitute complete treatment. The B.O.D. removal depends largely upon the strength of the raw waste and may average from 50 to 70 per cent. The effluent contains a high residual of chlorine.

Fig. 3 shows a typical small plant located at Grand Rapids, Mich., and Figs. 4 and 5 the larger chemical precipitation plant of the Oscar Mayer Packing Co. at Madison, Wis. The precipitation and sludge collecting units are longitudinal flow tanks of concrete construction, equipped with Chain-Belt cross flight sludge collectors and skimming mechanisms. The sludge concentration tank of steel construction is equipped with a "Tow-Bro" bottom sweep multi-intake hollow arm mechanism. The thickened sludge, transferred to the concrete holding unit, is dewatered in vacuum filters. The plant effluent, discharged to the Madison sewer, is further purified in the Madison Sewage Treatment Plant.

Laundry Wastes

The laundry is a service rather than a manufacturing industry. These plants are usually located so as to discharge their wastes into municipal-sewer systems, where, in most cases, the dilution is such that the presence of the waste is not noticeable. In some small communities and especially in institutions, laundry wastes at certain periods make up a large portion of the sewage flow.

The chief constituents of laundry wastes are soap and grease. This material interferes with sedimentation and forms an odorous and unsightly scum on the surface of sedimentation tanks. In cases where this condition becomes troublesome it may be necessary to treat the laundry waste in a separate unit.

Both chemical precipitation and biological filtration have been employed for the treatment of this waste. Of the two, biological filtration is the more effective. However, there are conditions where chemical treatment is advisable, especially when the process is used as an adjunct to treatment in a municipal plant.

The precipitation is carried out in fill-and-draw tanks. One or more tanks are required, having a combined capacity for the daily flow of waste (8 hours). The tanks are equipped with a flocculating mechanism. The coagulation period is 20 minutes and the minimum settling period is 2 hours. Sludge is drawn to a storage tank, lagoon or sludge beds according to the facility provided.

Ferric chloride or ferric sulphate are used for coagulation of laundry wastes. According to Boyer (2) a considerable saving of chemical may be accomplished by first adjusting the pH to 6.4 with sulphuric acid. The author, however, prefers to increase the amount of coagulant, since pH adjustment may be obtained more easily in this way. The average quantity of chemical required is about 3.5 pounds per 1000 gallons. The sludge volume is about 4 per cent of that of the waste treated.

Wastes From the Metal Industries

The chief wastes from the metal industries with which we are concerned here are the acid pickling liquors, plating room wash waters and spoiled cyanide solutions, and waste cyanide from heat treating processes.

Acid pickling liquors are discard-

[2]Boyer, J. A.: The Treatment of Laundry Wastes, Texas Engineering Experiment Station Bull. 42 (1933).

ed when the acid content is reduced to about 2 per cent. In addition to free acid, these wastes contain a high concentration of ferrous sulphate which upon hydrolisis exerts much the same acid reaction as the free acid itself and, in addition, utilizes oxygen in its change to the ferric state. Thus, these liquors have a high oxygen demand.

The most logical method of disposal of this waste consists of the recovery of the chemicals by evaporation and crystallization. Ferrous sulphate is removed in crystalline form and the acid reused to make up new pickling solution.

In many cases, no provision is made for the reuse of this liquor and it becomes necessary to neutralize it before it is discharged to the sewer. Lime is used to neutralize the acid and precipitate the iron. The manipulation of the neutralization process is made difficult due to the precipitation of a thick mass of jelly-like sludge. This mass is often so thick and viscous that it becomes necessary to dilute the liquor before the lime is added. The mixture is aerated with diffused air to cause the change of ferrous hydrate to ferric oxide which is then removed as a sludge and dried in lagoons or drying beds.

The weight of lime required varies with the strength of the pickling liquor. The average quantity is about 180 pounds per 1000 gallons of liquor.

Plating room wastes consist of spoiled cyanide cleaning solutions and washings from the process. Spoiled solutions may contain as high as 20,000 p.p.m. of cyanide. Plating room washings contain from 50 to 500 p.p.m. cyanide (average about 100 p.p.m.). In addition to the cyanide these washings may contain solutions of copper, chromium and other metal salts.

The chemical treatment of cyanide wastes may be accomplished by one of three processes. Washings may be effectively treated by the application of sulphuric acid and air in a specially designed tank. Since the hydrocyanic acid gas which is produced is very poisonous this process is somewhat hazardous unless extreme care is used both in the design and the operation of the equipment.

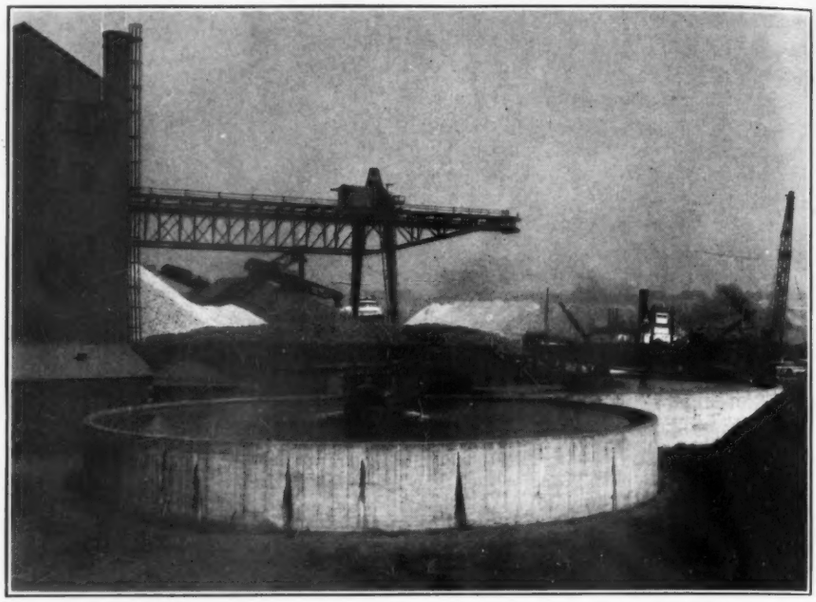


Fig. 7—Plant Treating Gas Scrubber Wastes from One of the Republic Steel's Operations.

Washings may also be treated by oxidation with potassium permanganate. This process is expensive and is accompanied by a sludge disposal problem. However, it is not as hazardous as the acid treatment. The resulting effluent contains potassium cyanate which is somewhat toxic to fish life.

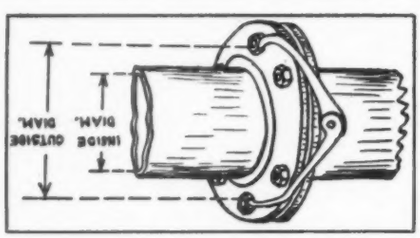
Spoiled cyanide solutions have been treated by the acid-and-air method. Here, however, the hazard is greatly increased because of the high concentration of the toxic gas. A full-scale installation of this type is shown in Fig. 6.

Perhaps the simplest method of treating strong cyanide solutions and waste cyanide from heat treating processes is by means of lime-sulphur solution treatment. This method consists of the addition of lime-sulphur (insect spray mixture) to the cyanide solution in equipment designed for the purpose. The reaction is rapid and the end point fairly well defined. Calcium thiocyanate is produced.

Summary

This brief discussion indicates a wide use for chemicals in the treatment of industrial wastes. This type of treatment seldom results in a complete removal of polluting material. Chemical coagulation is used as an aid to sedimentation and may or may not precede biological processes. In some cases it may even follow biological treatment.

How to Measure for Gasket*



Contrary to the common belief, it is not necessary to take a flange apart in order to measure for a gasket. Measurements may be accurately made from the outside, as indicated by the accompanying sketch. By means of a pair of calipers take the distance from the inside of one bolt to the inside of the bolt diametrically opposite. This gives the exact outside diameter of the gasket.

For the inside diameter, either measure the inside diameter of the pipe, as shown, or consult a handbook giving the inside and outside diameters of standard pipe. The table will give the exact inside diameter. The inside diameter of the gasket should be the same as the inside diameter of the pipe so that no water or gas pockets will be formed.

The above method is better and quicker than the one usually recommended, namely, to measure from center to center of the bolts and then subtract the diameter of the bolt. No error can be made if the above method is followed.

When ordering a gasket it is usually best to give the "exact" dimensions, particularly the exact distance between bolts, so that the manufacturer can furnish a gasket of the correct size. He will probably deduct 1/32 or 1/16 of an inch. It is better to leave the deduction to the manufacturer than to do it oneslf.

*Contributed by W. F. Schaphorst, M.E., Newark, N. J.

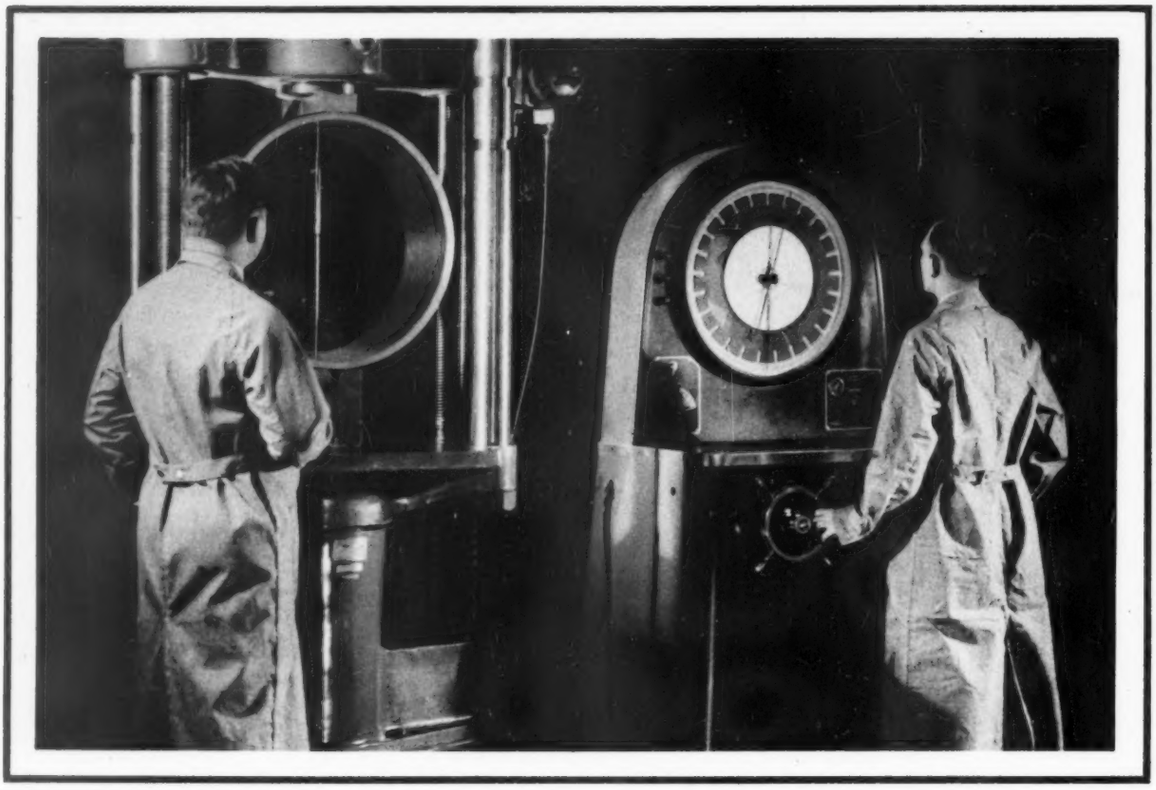
LITHOGRAPHED ON STONE BY ROCKWELL KENT

UNITED STATES PIPE AND FOUNDRY COMPANY

BURLINGTON, NEW JERSEY

America's Largest Producer of Cast Iron Pipe for

Water, Gas, Sewerage, Drainage and Industrial Service



* This illustration shows the "Ring Test" to determine the modulus of rupture. A ring cut from the pipe is subjected to progressively increased crushing load until failure occurs. Although not a required acceptance test, it is one of the additional tests regularly made by this Company to further check and maintain the quality of its pipe so that it will adequately meet severe service requirements.

* One of a series of controls in operation at each of our plants, beginning with inspection and analysis of raw materials and ending with tests of the finished product, all subject to the central control of our headquarters staff at Burlington.

U.S.
cast iron
PIPE

Centrifugally or Pit Cast for water, gas, sewerage, drainage and industrial services.

A PORTABLE EMERGENCY CHLORINATOR

By ALBION A. BAILEY
Acting Filtration Engineer
BUREAU OF WATER SUPPLY
BALTIMORE, MARYLAND

IN order to have standby equipment for the chlorination of broken water mains following possible air raids during the present emergency, a device for the purpose was designed and built at Montebello Filters, Baltimore, Md. The accompanying photograph shows the finished chlorinator, and the sketch shows the essential parts.

The outfit, as shown, consists of a hard rubber ejector which was machined from a 1⅝ in. rubber bar, two 10 ft. lengths of 1 in. rubber hose, 6 feet of ¼ in. copper tubing for the chlorine supply, and a solution tube.

The solution tube was made from a piece of ⅞ in. O.D. copper tubing 12 in. long. Through the copper tube is passed a 14½ inch length of ½ in. by ⅛ in. soft rubber tubing so as to project 2 in. beyond the metal on one end, and then the projection is brought back over the outside so that when the solution hose is attached only rubber comes in contact with the chlorine solution. A packing nut was made from a 1¼ in. pipe cap, and was placed on the solution tube before the end was flared out. This packing nut will fit an ordinary 1 in. corporation cock.

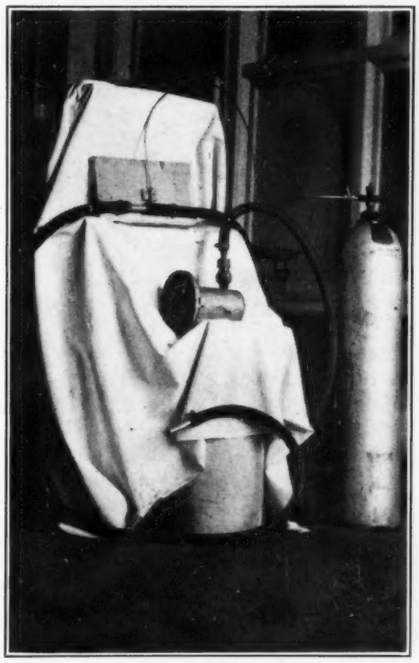
If there is danger of back pressure developing, a hard rubber or glass check valve should be inserted in the chlorine tube to prevent any water from entering the chlorine cylinder.

Method of Setting Chlorine Feed

No attempt should be made to measure the quantity of chlorine entering the main, but with a little experience the difference in sound within the ejector when the chlorine tank value opening is changed, gives an indication of the amount of chlorine being used. The chlorine residual within the main is the important factor. Therefore, samples are taken at frequent intervals during the chlorination process, and the quantity used is regulated according to this test.

The maximum capacity of the device depends principally upon the pressure in the chlorine cylinder. Therefore, some method of applying heat to the chlorine container must be resorted to for large quantities. As much as 25 pounds per hour have been applied under ordinary outside temperatures using 150 pound cylinders, and 40 pounds per hour using ton cylinders.

The Author



"Baltimore Model" Portable Emergency Main Chlorinator

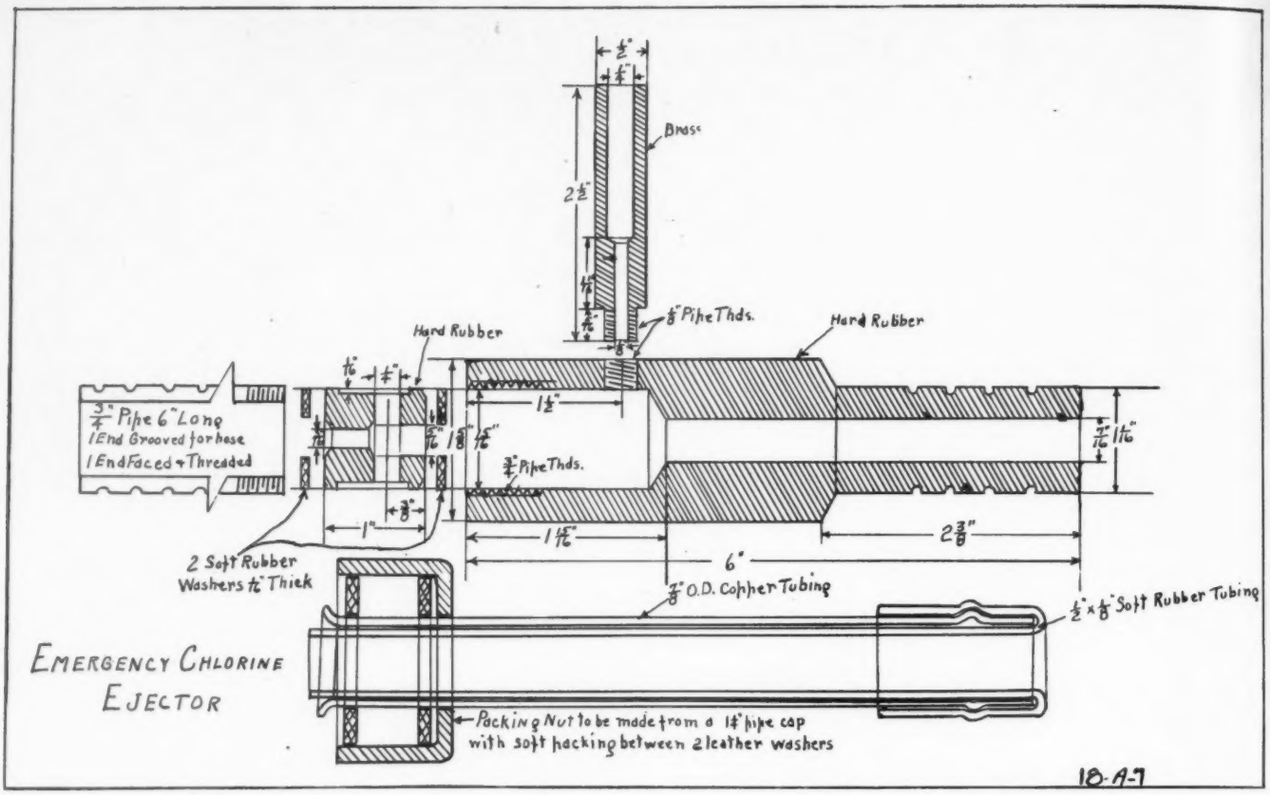
Accessories

As part of the equipment, each unit is accompanied by a box containing two 14 in. Stillson wrenches, 1 tank wrench, extra packing, 1 bottle of ammonia for the detection of chlorine leakage, 1 bottle of Ortho Tolidine solution and dropper, 1 Nessler tube, and 5 sample bottles for collecting bacteriological samples. Also, at least 50 ft. of 1 in. hose and adapters are necessary to make connections to either fire hydrants or nearby faucets for the actual chlorinator operation.

Operating Instructions

Each operator is also furnished with the following set of instructions for its operation:

1. See that the corporation cock is open and that the opening through the plug is exactly flush with the body. Insert solution tube through the corporation cock so that it projects about 2 in. into main, and then tighten stuffing box.
2. Connect water hose to supply furnished by repair crew.
3. See that there is a fire hydrant or other opening in the main, preferably at the highest point in the main, and see that this outlet is kept open at all times during the chlorination process.
4. Connect copper tube to chorine cylinder by means of the yoke clamp, using the small lead washer found in the cylinder valve cap as a gasket. Do not tighten the connection until after the water supply has been turned on.
5. After all connections have been made, turn on the water supply. If there is a suction at the tank, close the control valve and tighten the yoke clamp.
6. Open the chlorine cylinder valve about ½ turn, then open the control valve slightly. The amount this valve is to be opened can be gaged by the change in sound through the ejector. After a little experience, this becomes a very good indicator. From the dropping line of formation of moisture condensation on the outside of the tank, the quantity of chlorine used can be estimated.
7. Open the valve in the main slightly so that the chlorine solution will mix with water as the main fills.
8. Secure samples as soon as possible from the main. Make residual test and adjust the chlorine to give a cherry red color. It may be necessary to also adjust the valve in the main to secure this concentration. If sudden change occurs in sound of ejector, close the chlorine tank valve, loosen yoke clamp, and see if there is suction in the tube.
9. Close the valve in the main just before the main is completely filled and continue the chlorination until the main is entirely filled.


Brass
Hard Rubber
Hard Rubber
3/4" Pipe 6" Long
1 End Grooved for hose
1 End Faced & Threaded
2 Soft Rubber Washers 1/16" Thick
3/8" O.D. Copper Tubing
1/2" x 3/8" Soft Rubber Tubing
EMERGENCY CHLORINE EJECTOR
Packing Nut to be made from a 1" pipe cap with soft packing between 2 leather washers
10-A-7

Details of Hard Rubber Injector and Solution Tube for Injection of Chlorine Solution Into the Main

10. When chlorination has been completed, shut off the chlorine cylinder and control valve, and disconnect the tube. Then shut off the water supply to the chlorinator and main.
11. Loosen the stuffing box enough to free the solution tube, pull the solution tube out until the flanged end is against the packing, close the corporation cock, and then unscrew the stuffing box, removing the solution tube from the corporation.
12. Place the solution tube in the gutter or some other convenient place and with the chlorine control valve open again, turn on the water supply and flush the chlorinator for 5 minutes. Disconnect the water supply, allow the apparatus to drain as dry as possible, and then return to headquarters.

Under the direction of Mr. C. J. Lauter, Chemical Engineer in charge of the Dalecarlia Filter Plant at Washington, D. C., one of these units was thoroughly tested in the chlorination of a number of newly laid mains. Their tests showed that 8½ gallons of water per minute are required for most efficient operation, with pressure differential of 40 pounds per square inch. Also, in a test using a chlorine solution in place of gas, it was found that one gallon of chlorine solution per minute could be applied with a water pressure of 15 pounds per square inch, 2 gallons with pressure of 30 pounds per square inch, and 3 gallons with a pressure of 45 pounds per square inch.

Sixteen of these chlorinators have been built for use by the city of Baltimore. Two of them have been in intermittent service for the chlorination of new mains and they have functioned perfectly.

Washington, D. C., has also adopted the design and is building a number of units for use in emergency chlorination of both repaired and newly laid mains.

W.P.B. Creates Special Water Section

Headed by Arthur Gorman, as Chief

Arthur E. Gorman

Arthur E. Gorman of Chicago now heads the new activity of the Power Branch of the War Production Board as chief of its new Water Section. He will have a staff of professional and clerical assistants to work with him on matters assigned to the Section.

In brief, the scope of the work of the Water Section is outlined as follows:

(1) Making surveys of existing water supply facilities which may have become critical due to war operations.

(2) Stimulation of water conservation.

(3) Reviewing proposals for extensions of water systems.

(4) Maintaining liaison with other Federal agencies insofar as water supply requirements are concerned.

(5) Recommendation of policies and procedures for the WPB in allocation of present water supplies and in developing forms in order that the war-program be not handicapped by water shortages.

(6) Co-operation with other WPB Section, Branch and Division Chiefs, maintaining close relationship and uniformity in application of the Water Program particularly as it applies to the use of critical materials in developing additional water supply.

Until his appointment, Mr. Gorman was Chicago's Assistant City Engineer, in charge of the Water Quality Division.

EMERGENCY REPAIR OF DISTRIBUTION SYSTEMS*

By W. VICTOR WEIR
Superintendent
ST. LOUIS COUNTY WATER CO.
UNIVERSITY CITY, MO.

IF emergency distribution system repairs are to be handled in the least possible length of time, there must be careful preliminary planning. Everyone involved must be instructed and trained, and proper equipment must be provided. In spite of the fact that distribution system repairs are in most instances handled with dispatch, there is probably room for some improvement in every organization. The wartime requirments that water supply be uninterrupted to war production plants, and the wartime hazard that emergency repairs in amounts heretofore unthinkable may be required, indicate the need for a review of past and current practices. Thought must be directed not only along the lines of what has happened in the past and what has been done as a result, but what may happen and what new methods and equipment are available for use in such emergencies.

This paper may well be divided into the same steps as are followed when emergency repairs of a water works distribution system are required. First, someone is notified that repairs are needed. Second, men are dispatched to the scene. Third, they determine what needs to be done. Fourth, they do it.

The First and Second Phases

The first phase is the notification that an emergency exists. A message must be transmitted to a proper party in the water department. Where night telephone service is maintained, the problem of notifying the proper party, by relaying the message, is readily handled. This night service may be obtained by having a watchman answer phone calls. It may be handled by routing all calls to some station where men are on 24-hour duty. Again, it may be found advantageous to have certain jobs performed at night, such as auto maintenance work, so that one or more men will be available to the telephone at all hours.

*This paper, presented at the A.W.W.A. Conference on Wartime Water Works Problems, is reproduced by permission of the Association.

The Author

The second phase requires the dispatching of men to the scene of the incident. When the description of the damage suffered is full and lucid, a proper-sized crew can be dispatched. If, however, the description is meager, or is simply that "our water is off," it may be necessary to send one or more men to reconnoiter the situation.

When an intelligent report comes in, a proper crew and equipment can be dispatched. In several actual instances, where considerable areas were out of service, the intelligent report has come through after long delay, simply because the telephone lines were overloaded with futile but well-meaning messages that there was no water service. To prevent such a breakdown of telephone communications, many utilities have installed unlisted telephones in their service departments, the numbers being known only to foremen and other key men. These men are thus able to obtain telephone communication when the regular lines are swamped with calls which make them practically useless.

In the larger cities, regular night crews are often available on duty to handle off-hours' emergency work. These men may play pinochle four nights out of five, or they may perform some duties, such as repair work, which can be dropped immediately upon receipt of an emergency call. One large city water department uses its night crew to perform construction work, to be dropped in the event of an emergency. This crew is contacted by police radio when it is needed.

For most cities, the employment of a night crew is out of the question. The off-hours' emergency work must be performed by men called away from their homes. In these cases, men must have telephones and night gangs should be staffed with men living near each other, so they can quickly be picked up.

In the event of occurrence of multiple emergencies, it may be necessary to call out several crews at once. The calling of many men can best be done by the "chain" method. Only one man from a crew is called, and he, in turn, calls the rest of his crew; or two key men are called, and they each call two or three other men. Preparation for multiple emergencies require the designation of crew personnel ahead of time. Each man must know with whom he is to work and where he is to report. These schedules must be worked out in advance and each man should carry written instructions regarding his individual duty. Properly organized, a few telephone calls should set into motion a whole train of scheduled activity, enabling manpower mobilization in the shortest possible time.

The All-Important Third Phase

After men has been dispatched to the scene, we enter the third phase —What is to be done? Great volumes of water may be gushing up through the pavement. Valves must be closed. Which valves? And where are they? In these times, it is no longer excusable to have the valve locations in the photographic mind of a man who is sick at home. Neither is it excusable to have a good set of records at the office or on the single emergency truck now required to be several places at one time. The ideal situation provides each key man and each foreman with a distribution system layout and a complete set of valve records.

These records for use in the field must be complete, simple, not bulky, and easily provided, in as many copies as may be necessary. For small systems, several methods of preparing distribution sys-

tem records are acceptable. For large systems, the plat and list method as outlined in the A.W.W.A. Recommended practice for Distribution System Records (Jour. A.W.W.A., 32: 181 (1940) is extremely satisfactory and flexible. Too much stress can not be laid upon the necessity for adequate field records. The time available for their preparation is all too short, but their importance requires adequate preparation of this vital assistance during emergencies.

The fourth phase of the problem of emergency repair is simple—the men do it. The proper valves are closed. The excavation is made and de-watered. The pipe is repaired. Service is resumed. All this takes time, and the time involved depends upon the ability of the crew members, their training, their tools and the repair materials used. The job may take as many hours as the inch-diameter of the main if the piece to be replaced is a fitting. Half that time may be average if it is a broken pipe and a permanent repair with a solid sleeve is made. The time may again be cut in half if the repair is made with mechanical joint repair materials.

Speedy repair is important. No water is available in the affected area for industrial, sanitary or fire fighting purposes. Proper organization and proper equipment are required if the water works man is not to do "too little, too late."

Equipment

All too often the record shows that it took some other water department from four to six hours to close off a ruptured main. The right valves were not closed at first; or an unknown pipe line had been tied into the closure section. The time involved in closing two or three large valves and a few small ones, if the affected main is large, is not inconsiderable. Even three hours might be excellent time if several large valves must be closed manually. The need for power operated valve operating equipment becomes obvious where many large valves are in use. This equipment may be truck mounted, driven from a power take-off, or it may be motor-driven from an air compressor or portable electric generator.

If the repair must be made at night, artificial light in generous quantity should be provided. Acetylene generators or portable electric generators should be available on trucks answering night calls. The electric generators are probably the most satisfactory, since the entire site can be flooded with light from a very small amount of easily portable equipment.

If the excavation must be made through concrete, either a compressor with suitable tools or a gasoline-powered paving breaker should be available.

Where the pipe to be repaired is 20 in. or larger in diameter, the use of a truck-mounted crane, a common piece of contractor's equipment in a large city, will speed up both excavation and repair. A clam-shell bucket will make quick work of the wet excavation and the heavy pipe can be handled with ease. Tripod derricks made with 2-in. pipe legs will be strong enough for 20-in. pipe fittings, if handled properly.

Self-priming gasoline engine centrifugal pumps are "musts" on speedy repair work. Rather than purchasing trailer-mounted pumps, it will be advisable to put the same amount of money into smaller, more readily portable units, using two or more on a large repair job. If one small pump fails, the job still goes on. If a large pump fails, the repair job stops until the pump can be made operative.

When the pipe to be repaired must be cut, the use of a pipe cutting machine may be advantageous. The cutting time can be shortened by using an air motor for power. A heavy duty electric drill or flue roller can also be used for power, being driven by a portable electric generator of 1½ kw. or larger capacity.

Mechanical Jointing

With the pipe excavated and de-watered, the remaining work may take considerable time if lead joints and solid sleeves are used in making the repair. The use of mechanical joint solid and split sleeves, or a combination of them, will speed the job a great deal more.

With the use of mechanical joint repair fittings, the valve closures do not have to be as good as when poured joints are used. Neither does the excavation have to be as completely de-watered, since the bolt-fastened joints can be made under water, if necessary. Also, pipe ends do not have to be carefully cut off. Fittings are available which will cover jagged pipe ends with ease.

While cast-iron pipe as a rule still uses the bell and spigot method, the use of mechanical joint fittings for making repairs is becoming comparatively common. The higher cost of these fittings as compared with poured joint fittings is largely offset by the saving in labor cost due to shortening up the time of repair. One man less is generally required on the repair crew since there is no need for a lead man. The use of mechanical joint fittings will receive a boom during this war emergency, but the increased use of these fittings is here to stay.

With the possibility that numerous repair crews may have to be put in the field at one time, if multiple incidents occur, these crews will necessarily be smaller than usual or the men will be inexperienced. The use of mechanical joint fittings will allow inexperienced men to make good repairs after very little training, while it would take a great deal more time to develop lead melters and calkers.

Wooden Plugs

Wood is often an excellent material to use in making temporary repairs. Small holes can be stopped with wood plugs. These plugs can be sawed off flush, drilled out with a tapping machine and the permanent repair made with a brass plug.

In some cities, properly tapered wood plugs are used to plug the ends of 4-, 6- and 8-in. mains. The plugs, of course, must be blocked or otherwise secured to keep them in position when pressure is built up in the main. The use of wood plugs offers a very quick way to stop water wastage where a number of small mains, 4 to 8 in. in size, are broken. If found desirable, these plugs could be bored and smaller steel pipes driven into the plugs so that connections between ends of severed mains could be made temporarily with hose.

One way to minimize the time required to make water main repairs is to have the necessary materials stored as near the repair job as possible. Since it is impossible to know where the emergency will occur, the best procedure is to have small but adequate stocks of pipe and fittings stored at various points on the distribution system. It will then be unnecessary for the repair truck to go to a central storeyard, often several miles from the broken main, to get the necessary materials. Whenever anything is removed from one of these material caches, it should be reported and immediately replaced. All crews should carry lists showing the amounts of material available at each place.

Sterilization

Sterilization is essential after distribution system repairs are made. The valves which are closed to segregate the affected portion of the distribution mains should not be

opened as soon as the repair is made. The crew foreman or other responsible man will have to study the piping layout to determine how the probably contaminated section can be properly flushed and then sterilized. After flushing, hypochlorite or other chlorine solution should be fed into one end of the affected piping and allowed to disperse through the section by drawing water from the other end. After an adequate contact period, while the water in the main contains from 50 to 100 ppm. of chlorine, the main should again be flushed before being placed in service. In sterilizing and flushing, it may be necessary to close down one or more additional valves to get fire hydrants into the affected portion of the pipe system so that proper flushing and sterilizing can be done.

Foremen's schools may be necessary to teach the proper procedures in flushing and sterilizing mains. A number of problems involving repairs at selected spots in the distribution system will convey to the foremen the procedures to be followed. It is difficut to state categorically just how sterilization should be done. A dozen different procedures might have to be followed in a single distribution system, depending upon the spacing of hydrants and valves.

Equipment for sterilizing must be provided. Small iron force pumps with rubber check valves are fine for sterilizing small mains with hypochlorite solution. Larger mains will require power pumps with large solution crocks or gas-feeding equipment. Since similar equipment is necessary in sterilizing newly laid mains, the purchase or construction of these items can not be considered to be an extravagance.

Radio communication should be utilized wherever possible. Due to the present impossibility of constructing new short wave stations, the best chance is the use of police radio assistance where it can be obtained. While two-way communication will not be possible under most circumstances, receivers can be had or converted to use so that medium high frequency police stations can be received. It should be borne in mind that radio may not be worth a great deal if telephone service is gone, since it may be very difficult to get a message from the water department to the police department broadcasting station. Messenger service may have to be planned.

Hero of Corregidor a Chemist

Capt. A. E. Huff of Monsanto

It gave us something of a thrill to find on page 20 of the June issue of "Monsanto Magazine" the story of the hero of Corregidor under the caption, "A Chemist Rescues the Flag."

The reader will remember the news story which told of that lucky hit of a Japanese shell which cut down our flag flying above Corregidor, to instantaneously humble the stars and stripes, but also related how our colors had not more than hit the ground before they were rescued by an unknown hero and sent aloft again.

Well, the story in "Monsanto Magazine" proudly claims the hero—Captain Arthur E. Huff—as a former Monsanto chemist until he was given leave of absence to join up. On Corregidor Captain Huff was in command of an anti-aircraft battery when that fateful shell came over and cut the flag down. Seeing what had happened, he called for volunteers and led three of his men in a 600-yard dash across what was probably the most dangerous stretch of ground in the world at the moment. While nine-inchers were carrying messages from the Japs with deadly regularity, and dive-bombers were dropping their eggs and spraying everything in sight with machine guns, Captain Huff and his men remained at their task long enough to repair the halyards and again hoist the flag.

For this exhibition of bravery Captain Huff was decorated with the Silver Star Medal and was cited by General Wainwright, commanding, "for gallantry in action and risking his life in restoring the colors to the Corregidor flag-staff."

When we read this we requested Captain Huff's picture from Monsanto and are proud to use it on this page in introducing our readers to the chemist hero of Corregidor.

Captain Huff, a Washington University graduate of 1932, was a trained soldier. As a reserve lieutenant he went to training camps regularly every summer and was ready when the call came for young officers of his ilk.

A letter from Howard Marple, editor of the prize winning "Monsanto Magazine," adds something to the story. Mrs. Arthur Huff was honored by the City of Boston in being its guest on Flag Day. And Boston's mayor presented Captain and Mrs. Huff's young daughter Mary Jean with a beautiful fold flagpole and silk flag for her to cherish in the years to come.

Editor Marple adds that Huff was a splendid chemist and now a good soldier, of whom Monsanto is justifiably proud—and we'll bet that Mary Jean is, too.

Promoted

Ellwood Johnson

Ralph Fuhrman

Ellwood Johnson, until recently Superintendent of the District of Columbia Sewage Treatment Plant, has been promoted to the position of Engineer of Sewers of the District. In this capacity Mr. Johnson has in his charge the design, construction and operation of the sewerage system of the whole of the District.

Serving the District since 1909, Mr. Johnson acted as Resident Engineer in charge of construction of its $3,500,000 treatment plant at Blue Plains, D. C., and upon its completion became Superintendent of the plant. During this time Mr. Johnson also was engineer in charge of the project of rehabilitation of the District's largest sewage pumping station and construction of the Rock Creek Diversion Sewers at a cost of about $3,500,000. These activities are all under J. B. Gordon, Director of Sanitary Engineering for the District.

Ralph E. Fuhrman, Assistant Superintendent of the D. C. plant, has been made Superintendent.

CANADA'S WARTIME WAGES POLICY

By ROSS L. DOBBIN
General Manager
PETERBOROUGH UTILITIES COMM.
PETERBOROUGH, CANADA

SHORTLY after the War started, the Dominion Government began to be apprehensive about the trend of wages and inflation, as it was apparent that Canada would be required to supply to the limit of its ability, munitions of war to the Empire and its allies. New plants were springing up all over the country and existing plants were being rapidly expanded.

Labor leaders were concerned with the prospect of increased cost of living, and the call for wage increases was incessant.

Finally, in December, 1940, an Order in Council known as P.C. 7440, was passed, fixing all wages and salaries in the Dominion at the highest rates established betwen 1926 and 1940, regarding these wages as fair and reasonable. Such wages were to be supplemented by a separate "Cost-of-Living Bonus," usually of $1.25 per week for each rise of 5 per cent in the cost of living, in order to offset increases in the cost of basic necessities of life.

What the Order Does and Aims to Do

P.C. 7440 does three things. It sets a ceiling on wage rates, at the highest level ever reached in this country. It also sets a floor below which wages may not fall. It provides for cost-of-living bonuses to protect the workers' basic standard of living from being undermined.

All are agreed that none shall profit from the war. This policy is expressed in the government's efforts to control and tax profits, to control prices and rents. It must be rounded out by control of wages, for they constitute two-thirds of the national income. If dollar wages continue to increase faster than the flow of civilian goods and services can be increased, prices must rise, the cost of living must increase, and REAL wages (the purchasing power of money wages), must fall. It is this that P.C. 7440 is designed to avoid, or at least to restrain.

It is obvious that no class in Canada should be given preferred treatment in sharing the war burden, and labor would be the last class to shirk its responsibility and its share of sacrifice. Yet the government does

The Author

realize that labor must be protected to the extent that its health, its high morale and its productive capacity must not be impaired. These intangible factors are weapons necessary to win this war. Hence P. C. 7440 has been enacted to insure that excessive inroads on the cost of basic necessities only, should not adversely affect the productive capacity of Canadian labor. Beyond that—and in addition to protection from any non-complying employers — labor should not ask for any favors or seek to take advantage of a life and death struggle.

P.C. 7440 itself calls for no sacrifice, except perhaps a sacrifice of the temporary gains of inflation which would more than rob the worker and others. It attempts to stabilize the industrial situation for the duration. It attempts to prevent the very great inequality of sacrifice that inflation will exact.

The Cost-of-Living Bonus

The Cost-of-Living Bonus is based on the increase in the cost of living as measured by the Cost-of-Living Index prepared by the Dominion Bureau of Statistics for the Dominion as a whole.

The increase is to be measured from August, 1939, or from the effective date of the granting of the last previous increase in wage rates or bonus, which brought the wage rate level of the employee up to a fair and reasonable level.

The bonus is paid in the first instance only if the cost of living has risen by as much as 5 per cent; thereafter the bonus is increased only if the cost of living has risen by an additional 5 per cent or more and three months have elapsed since the last previous determination of the amount of the bonus, or decreased only if the cost of living has fallen by 5 per cent or more and three months have elapsed since the last previous determination of the amount of the bonus.

Subject to the provisions of the above, for each rise of 1 per cent in the cost of living the amount of the bonus is 25 cents per week, except for male workers under 21 years of age and female workers, who, if employed at basic rates of less than 50 cents an hour on jobs which by custom or practice are not ordinarily assigned to adult male workers, shall receive a bonus of 1 per cent of their basic wage rates.

The Cost-of-Living Index in October, 1941, was 14.6 per cent higher than when the war broke out. The bonus is based on a basic wage for male employees over 21 years of age of $25 per week, so that the bonus paid since that time has been 14.6 times 25 cents per week, or $3.65. In the case of male employees under 21 years of age and all female employees a Cost-of-Living Bonus of 14.6 per cent of their weekly earnings is paid, up to a maximum bonus of $3.65 per week.

How It Has Worked

On May 12, 1942, the Dominion Government announced that the Cost-of-Living Index at April 1, 1942, was 115.9, and, as it had not risen by one whole point or more above the index number for October 1, 1941, of 115.5, there was to be no change in the amount or percentage of cost-of-living bonuses then being paid.

On August 4, 1942, the Government announced that the index had increased by 2.4 per cent since October, 1941, and consequently there was to be an increase in the bonus of a corresponding amount.

The bonus now amounts to $4.25 per week beginning August 15, 1942, with variations as explained in a former paragraph.

It was further announced that the increase in the index was due to increases in food prices, of which beef and potatoes had accounted for 90 per cent.

The fuel and lighting index was down from 122.6 to 112.5. There was

a slight increase in the clothing index from 119.9, while there was no change in the three other groups —home furnishings and services, rentals and miscellaneous.

The order does not apply to agricultural workers, domestic servants in private homes, Government and municipal employees, but otherwise includes all persons receiving salaries or wages of less than $175 per month.

The wage policy as outlined above is helping to stop or limit inflation. This is its main purpose. Workers whose memories go back to 1914-1920 do not need to be reminded that once inflation starts wages never catch up with the cost of living. On the other hand, if inflation cannot be prevented, P. C. 7440 gives labor a shield against the worst consequences of rising prices.

During the last war wages and the cost of living increased, as compared with 1913, as follows:

	1914	1915	1916	1917	1918
Wages	1%	2%	10%	26%	47%
Cost of living	2%	5%	17%	39%	59%

No Bonus for Earners of More That $250 Per Month

Under another Order in Council, all salaries or wages over $250 per month are not eligible for a bonus of any kind, and cannot be raised except with permission of the Federal authorities. A newly appointed salaried official cannot be paid a rate of salary higher than the rate previously paid to another official performing substantially the same services. If there is no such guide, the employer shall not pay a rate of salary higher than is reasonable and proper, in comparison with rates paid to salaried officials for similar services in similar businesses.

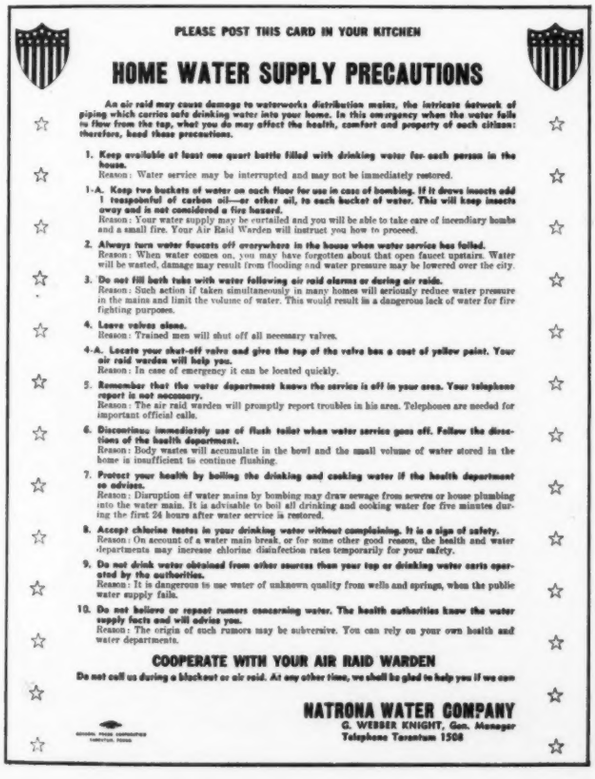
This provision has tended to check the practice of employers trying to entice employees from one to another by the promise of higher salaries.

The results of these orders have been evidenced in the few industrial disputes that Canada has experienced in the past year. Any troubles that have occurred have been mainly about working conditions and other matters. Labor generally seems to be satisfied with the working out of the Cost-of-Living Bonus, and the Government's efforts to check inflation.

Although the order excluded Government and municipal employees, it was provided that they might be paid the bonus if the governing bodies in each case decided to do so. The Peterborough Utilities Commission did decide to pay the bonus, and many other utility commissions do likewise. Recently the Federal Government has decided to pay the bonus to all civil service employees earning less than $2,100 per year.

Natrona's Home Water Supply Precautions

An Instructive and Colorful Placard for Customers' Kitchens



PLEASE POST THIS CARD IN YOUR KITCHEN

HOME WATER SUPPLY PRECAUTIONS

An air raid may cause damage to waterworks distribution mains, the intricate network of piping which carries safe drinking water into your home. In this emergency when the water fails to flow from the tap, what you do may affect the health, comfort and property of each citizen: therefore, heed these precautions.

1. Keep available at least one quart bottle filled with drinking water for each person in the house.
Reason: Water service may be interrupted and may not be immediately restored.

1-A. Keep two buckets of water on each floor for use in case of bombing. If it draws insects add 1 teaspoonful of carbon oil—or other oil, to each bucket of water. This will keep insects away and is not considered a fire hazard.
Reason: Your water supply may be curtailed and you will be able to take care of incendiary bombs and a small fire. Your Air Raid Warden will instruct you how to proceed.

2. Always turn water faucets off everywhere in the house when water service has failed.
Reason: When water comes on, you may have forgotten about that open faucet upstairs. Water will be wasted, damage may result from flooding and water pressure may be lowered over the city.

3. Do not fill bath tubs with water following air raid alarms or during air raids.
Reason: Such action if taken simultaneously in many homes will seriously reduce water pressure in the mains and limit the volume of water. This would result in a dangerous lack of water for fire fighting purposes.

4. Leave valves alone.
Reason: Trained men will shut off all necessary valves.

4-A. Locate your shut-off valve and give the top of the valve box a coat of yellow paint. Your air raid warden will help you.
Reason: In case of emergency it can be located quickly.

5. Remember that the water department knows the service is off in your area. Your telephone report is not necessary.
Reason: The air raid warden will promptly report troubles in his area. Telephones are needed for important official calls.

6. Discontinue immediately use of flush toilet when water service goes off. Follow the directions of the health department.
Reason: Body wastes will accumulate in the bowl and the small volume of water stored in the home is insufficient to continue flushing.

7. Protect your health by boiling the drinking and cooking water if the health department so advises.
Reason: Disruption of water mains by bombing may draw sewage from sewers or house plumbing into the water main. It is advisable to boil all drinking and cooking water for five minutes during the first 24 hours after water service is restored.

8. Accept chlorine tastes in your drinking water without complaining. It is a sign of safety.
Reason: On account of a water main break, or for some other good reason, the health and water departments may increase chlorine disinfection rates temporarily for your safety.

9. Do not drink water obtained from other sources than your tap or drinking water carts operated by the authorities.
Reason: It is dangerous to use water of unknown quality from wells and springs, when the public water supply fails.

10. Do not believe or repeat rumors concerning water. The health authorities know the water supply facts and will advise you.
Reason: The origin of such rumors may be subversive. You can rely on your own health and water departments.

COOPERATE WITH YOUR AIR RAID WARDEN

Do not call us during a blackout or air raid. At any other time, we shall be glad to help you if we can

NATRONA WATER COMPANY
G. WEBBER KNIGHT, Gen. Manager
Telephone Tarentum 1508

G. Webber Knight, General Manager of the Natrona Water Co. of Natrona, Pa., has sent us a copy of Natrona's instructive, inclusive and attractive kitchen placard of air-raid home water supply precautions here illustrated.

This black and white reproduction is a long cry from the colorful job of printing in red, white and blue. For instance, the caption, "Home Water Supply Precautions," is in "American" red, as is the final instruction to "Cooperate With Your Air Raid Warden." The two shields are in red, white and blue and the border stars are alternatingly red and blue. The instructions generally are in blue print. The card, of course, is white.

These placards were produced at the expense of the Natrona Water Co. and were distributed by Natrona's Air Raid Wardens. (There's a point here.) They were printed by the General Press of Natrona, Pa., at a cost of $4.50 per thousand. We understand from Mr. Webber that complying with requests he has authorized General Press Corp. to supply any other water utility desiring these placards at the same price per thousand.

Any who may wish to order would do well to request a specimen placard from Mr. Webber or General Press Corp., make such changes as may be desired, and insert the company or department name for filing with the order. There will without doubt be a charge made for all changes requested other than those of a minor nature, such as the name of the utility, etc.

ONE OF NEW YORK'S EMERGENCY WATER SERVICE TRAINING SCHOOLS

The accompanying picture was made at one of the three day Regional Water Service Training Schools held during July in New York State and arranged by the State Office of War Training Programs and the State Mutual Aid Plan for Water Service.

This particular picture was taken during the school held at Buffalo July 29-31, with 225 men attending. The four other Regional Schools, of three days each, were held in New York City, Albany, Syracuse and Elmira during the latter half of July.

The purpose of these schools was to instruct key water works men who were to return to their communities and conduct similar classes for the training of local personnel and auxiliaries to be pressed into service during any emergency. The programs included lectures by operators on "Organization and Operation of the Local Water Works for an Emergency"; "Location and Operation of Valves and Hydrants"; "Temporary Repairs and Broken Pipes"; "Use and Operation of Repair Equipment"; "General Repair Technic"; "Plans of Action in Emergency"; "Disinfection." The "Field Lessons" consisted of such demonstrations as here pictured of methods of emergency disinfection of mains, reservoirs, etc., and demonstrations of the use of repair equipment and actual repair making by operating crews. The white shocked "demonstrator" in the picture is W&T's "war-horse," Al. Johnstone.

The Buffalo School closed with a dinner at which Alan Drake, Director of Water, acted as toastmaster. Brief talks were made by Buffalo's Mayor and Newell Nussbaumer, Commissioner of Public Works, and Earl Devendorf, State Water Supply Coordinator and Director of the successful N. Y. Regional Schools.

Among those attending the Buffalo School were several out-of-state operators, including the president-elect of N.E.W.W.A., Harold Brigham of Marlboro, Mass.

Digester Gas Being Used by the Swiss as Gasoline Substitute

We understand that Zurich, Switzerland, has found digester gas from the local sewage treatment works to be the best available substitute for gasoline as truck fuel. The gas has been taken by the municipal gas works for enriching the less calorific coal-gas. Now it is being compressed and used from cylinders as gasoline substitute for operating some of the city's trucks—the daily gas supply available being equivalent in engine fuel to 422 gallons of gasoline.

[Under existing circumstances of waiting hours in line in the East for the 4 gallons of gasoline ration, many of us wish that we had a pressure tank and portable compressor on our cars. How much simpler it would be to "fill up" at some sewage plant operated by a friend than to burn up half the gasoline ration in the mere act of getting it.]

Demonstration of Emergency Chlorination and Main Disinfection—Regional Water Service Training School, Buffalo, N. Y.

HIGHEST DEGREE OF PURIFICATION . . . SPEEDY AND LOW COST CONSTRUCTION . . . ECONOMIC AND SIMPLE OPERATION

WITH "CHICAGO" EQUIPPED ACTIVATED SLUDGE PLANTS—SMALL—MEDIUM—LARGE

Summary of Operating Data for 1941

City	Plant Superintendent	Design Sewage Flow M.G.D.	5 Day B.O.D.-p.p.m.			Suspended Solids-p.p.m.		
			Raw Sewage	Final Effluent	Per Cent Reduction	Raw Sewage	Final Effluent	Per Cent Reduction
Belvidere, Ill.	Miles Lamb	1.180	223	5	97.8	242	3	98.7
Buchanan, Mich.	R. O. Dempsey	0.500	176	9	94.9	114	10	91.2
Canton, Ill.	F. D. Hammond	1.150	219	8	96.3	355	3	99.2
Hartford City, Ind.	B. E. Cox	0.650	322	11	96.5	241	13	94.5
Celina, Ohio	Carl Bauer	0.900	641	31	95.2	519	51	90.1
Lake Charles, La.	S. S. Crawford	1.100	198	8	96.0	304	7	97.7
Marion, Ind.	D. Backmeyer	4.000	249	13	94.8	289	14	95.0
Ladd, Ill.	Myron Tenari	0.145	325	12	96.3	178	8	95.5
Gary, Ind.	W. W. Mathews	40.000	152.25	8.6	94.3	206.6	10.4	94.9

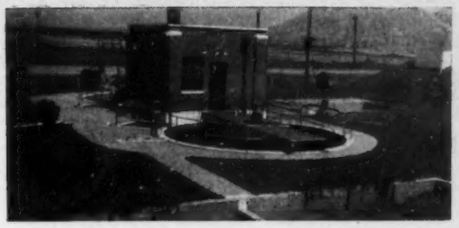
The above data was furnished by the plant superintendents. Copies of their original daily records will be furnished upon request to Chicago Pump Company.

These records show that "Chicago" equipped Activated Sludge Plants produce the highest degree of purification. Small, medium and large plants are represented—taken at random from among 134 plants having "Chicago" Air Diffusion Systems with Swing Diffusers or Stationary Diffusers, Combination Aerator-Clarifiers or Mechanical Aerators.

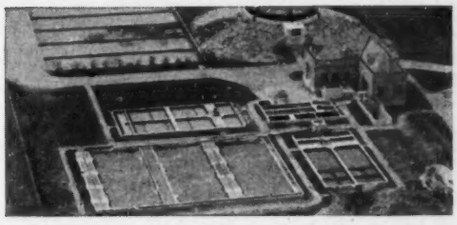
Operator Training Service

Our Operating Sanitary Engineers with definite knowledge of process control and plant regulation, BASED ON 10 YEARS' EXPERIENCE, train the plant operator to produce a consistently high degree of purification under widely varying sewage flows and strengths.

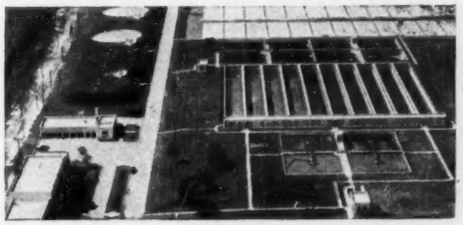
SEND FOR LITERATURE ON THE ACTIVATED SLUDGE PROCESS



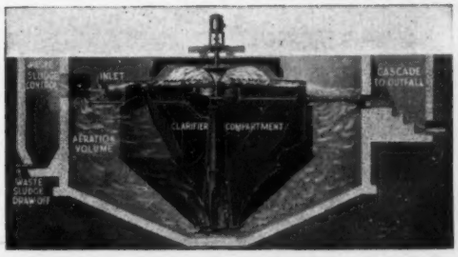
0.145 M.G.D.—Ladd, Ill., plant. Charles DeLeuw & Co., engineers. "Chicago" Combination Aerator-Clarifier. See operating data.



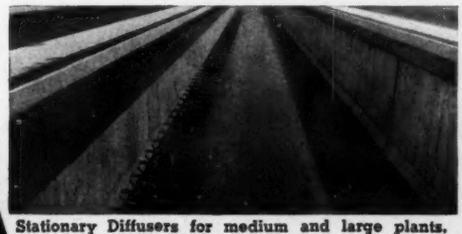
0.900 M.G.D.—Celina, Ohio, plant. Paul A. Uhlmann, engineer. "Chicago" Air Diffusion System with Swing Diffusers. See operating data.



40 M.G.D.—Gary, Ind., plant. Alvord, Burdick & Howson, engineers. "Chicago" Air Diffusion System with Stationary Diffusers. See operating data.



Combination Aerator-Clarifier for housing projects, small camps, institutions and small towns.



Stationary Diffusers for medium and large plants.

Swing Diffusers for medium and large plants.

134 SUCCESSFUL "CHICAGO" EQUIPPED ACTIVATED SLUDGE PLANTS SINCE 1936

Prove the Efficiency of the Process with Rationally Applied "CHICAGO" Equipment and Operator Training Service

CHICAGO PUMP CO. SEWAGE EQUIPMENT DIVISION

2336 Wolfram Street, CHICAGO, ILL.
Phone BRUnswick 4110

VACUUM—CONDENSATION—CIRCULATING—BILGE
FIRE — HOUSE — SEWAGE — SCRU-PELLER PUMPS
AERATORS—COMMINUTORS—SAMPLERS

REPRESENTATIVES THROUGHOUT THE UNITED STATES AND FOREIGN COUNTRIES

Like the Sterling mark on silver the 'AQUA NUCHAR' trade mark on a bag of Activated Carbon signifies quality.

INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP & PAPER COMPANY

230 PARK AVENUE NEW YORK CITY
35 E. WACKER DRIVE CHICAGO ILLINOIS
748 PUBLIC LEDGER BLDG. PHILADELPHIA, PA.
844 LEADER BLDG. CLEVELAND, OHIO

THIRTEEN years ago the City of Philadelphia salvaged, reconditioned and sold to the City of Glendale, California, a 24-year old, 48-inch cast iron water main removed on account of subway construction. Glendale used the salvaged pipe, bought at a substantial saving, in the construction of an intercepting sewer crossing under the Los Angeles River. In 1938, after satisfactory service in its second location for 13 years, it became necessary to re-route the sewer line. The city authorities thereupon decided to take up the pipe for the second time and re-use it in a third location.

It is impossible to foretell future requirements or population shifts in metropolitan cities but any public official can be sure that, when water or sewer mains must be abandoned or re-routed, the pipe can be salvaged or re-used, if it is cast iron pipe.

Pipe bearing this mark is cast iron pipe.

TRADE MARK REG.

Available in diameters from 1¼ to 84 inches.

CAST IRON PIPE RESEARCH ASSOCIATION, THOMAS F. WOLFE, RESEARCH ENGINEER, 1015 PEOPLES GAS BUILDING, CHICAGO, ILLINOIS

CAST IRON PIPE

Because he's a conscientious objector!

Because he's a conscientious objector to the complacent attitude of his fellow citizens, this man works extra hours so that *they* may rest easily! Tonight, he pores over a map marked with a network of lines and symbols: the life-giving veins and arteries of a city that cannot live without water.

He's the water works engineer, and he knows that every valve in the city's vital water works system must function properly *at all times* — to be ready in an emergency.

Ludlow valves afford best protection against possible tie-ups in the life-giving flow of a city's water. These rugged valves employ the famous double-disc, parallel seat principle, developed and perfected by Ludlow. Because of this method of construction, they operate smoothly at all times, and close securely — even after years in the open position.

Water works engineers can depend upon Ludlow Valves today *and tomorrow* — as they have for three-quarters of a century. May we help you now? Catalog is yours for the asking.

THE LUDLOW VALVE MFG. CO., INC.
TROY, NEW YORK

Construction Features: Self-releasing 30° angle wedges and free-floating gates, self-adjusting to seats, afford smooth, trouble-free performance, long service. Rings are cleaned throughout stroke action. Gates are wedge-locked directly opposite ports and completely unwedged before raising. Ample tolerances provide easy action. Simple construction permits easy replacement of parts.

LUDLOW VALVES
SINCE 1866

CENTRAL STATES SEWAGE WORKS ASS'N MEETS IN TWIN-CITIES

Program Features Priorities and Maintenance and Repair

THE Central States Sewage Works Association which embraces the states of Minnesota, Wisconsin, Illinois and Indiana held its 15th Annual Meeting in the northern end of its territory—Minneapolis—on June 18th and 19th. (As explained in our July issue, it proved impossible to include this report in that issue as had been planned. We felt that the paper on the priorities situation by Mr. J. A. Krug, Chief of the Power Division of the War Production Board and others which seemed important to the war effort should be given the space in our July issue which had been initially held for this report and that of the A.W.W.A. Wartime Conference in Chicago, which followed the Central States meeting by a few days.)

Proud Presidents

Kerwin L. Mick, Chemist,

Minneapolis-St. Paul Plant

George W. Martin, Supt.,

Water and Sewerage, Green Bay, Wis.
(As retiring president, Martin is passing over to Mick, as the new president, the cup won by the Central States Assn. for having the highest man-mile record for member attendance at the New York convention of the Sewage Works Federation.)

No. 1 Host and "Principle Assistant"

George J. Schroepfer, Chief Engineer, Minneapolis-St. Paul Sewerage Commission (Director and Vice-President of the Sewage Works Federation.)

George's Secretary, Miss Eleanor Gabler (Managed the registration desk as efficiently as her boss does the Twin Cities Treatment Works.)

The program of the Central States meeting was sufficiently attractive in topics to draw a large attendance, but apparently the distance that Minneapolis is from the center of the four state territory and the transportation problem were the factors which accounted for the exceptionally thin attendance when considering its other meetings in recent years.

A Trolley Car Inspection Trip

And speaking of the transportation problem the local committee on arrangements, even with the backing of the Minneapolis-St. Paul Sanitary District—including St. Paul's board member, Water Commissioner and No. 1 Conventioneer, Milton Rosen—were unable to secure bus transportation for the trip of inspection to the Twin-Cities Treatment Works. So a rumbling trolley-car (freshly painted, however) was the conveyance from the Hotel Nicollet in Minneapolis to the St. Paul terminus, from which point automobiles were used for the balance of the journey to the plant. Many members and guests also visited the interesting so-called sewage treatment plant of South St. Paul, but in fact an industrial waste treatment plant receiving about 10% of its load as domestic wastes and the balance in the form of packing-house wastes. The plant pictured in part with this report provides primary sedimentation, grease skimming, mechanical flocculation, intermediate clarification, trickling filter treatment and final clarification. The unbelievably heavily loaded filters do a remarkable job as de-colloiders and oxidation units, are backwashed as frequently as clogging conditions dictate. The bill for treatment is paid by the several packers who pro-rate the assessment among themselves on the basis of animal kill for the month. This interesting scheme of letting the City supply the plant, do the treating and collecting for such from the industry collectively through a committee has worked out admirably to the advantage of all concerned. The plant has plugged along taking all that's given it and turning out an effluent of strength equivalent to medium strength domestic sewage, the residual B.O.D. being in an un-settleable form subject to effective dispersion within the river and creating no local nuisance.

"Spotless Town's" Original Plant

Getting back to the Twin-Cities plant, where inspection followed the late afternoon dinner served in the swanky and spotless Administration Building (see picture), a visit to the screen house revealed that even this hard to keep neat department was in itself a spot where the dinner could have been served. In fact, it can be said by this writer who has visited many hundreds of sewage plants that the screen house was fresher and more odor-free than any plant ever visited. The ventilating system of the Twin-Cities plant well merits the study of designing engineers. This was just the introduction to what proved to be the original plant of "Spotless Town."—Hats off to Chief Engineer George Schroepfer and his organization that keeps up the loose ends and wipes out the "spots." The same condition of appearance was observed even in the sludge pumping station and vacuum filter and incinerator building. We took a look behind the curtains and found the stores room and machine shop just as tidily kept. There's "good-housekeeping" aplenty on the banks of the Mississippi at Pig Island.

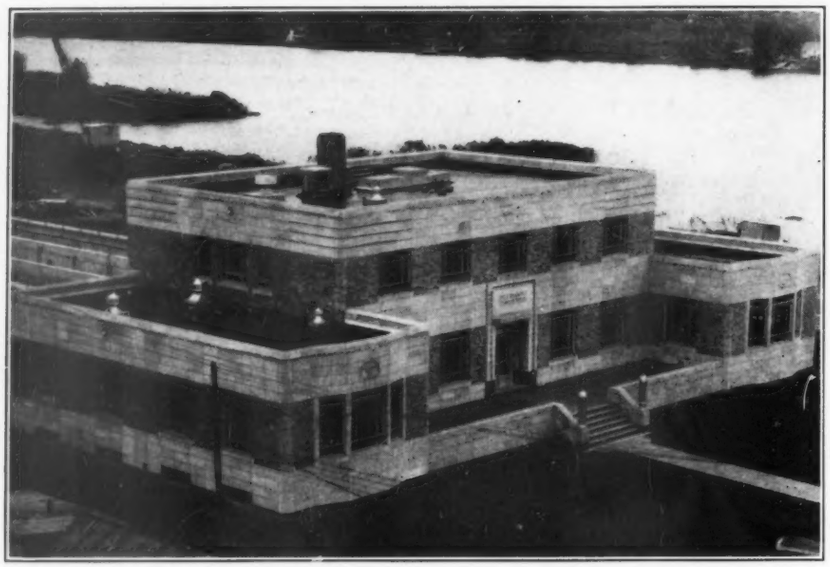
Secretaries

The Retiring Secretary (left), E. J. Beatty, Supt., Treatment Works, Neenah-Menasha, Wis.

The New Secretary (right), John C. Mackin, Supt. Treatment Works, Madison, Wis.

Program Highlights

The opening gun proved an important one on the program. What



Administration Building and Laboratories, Twin Cities Plnat
(Vista from the board room, up the river, is that of a country club)

is considered the very clearest exposition of priorities and W.P.B. orders and ratings, as they apply to water and sewage works, which this reporter has ever heard prior to the address of J. A. Krug before the A.W.W.A. was given by Priorities District Manager, W. F. Kiesner, Director of the W.P.B. office in Minneapolis. More of this later.

Then came the luncheon address of Dr. Walter H. Judd, a former medical missionary to China. Dr. Judd stirred his audience by drawing back the curtain on conditions in the Orient which led to the war of Japan on China and eventually to the Japanese attack on America. We can say that the America which insisted on the profitable business of supplying materials to Japan for profit in order that the Yellow Peril could continue her rape of China and prepare for Pearl Harbor made some history which unfortunately can not be rubbed out so that future generations may not know what the profit motive has and will cost America and her allies before the end is seen of World War II. Dr. Judd minced few words for he apparently knew and spoke the truth. Well, the least said at this stage the better. America may have more dollars as the result—but, what else.

Awards

The highest award of the Association was voted Walter A. Sperry of Aurora, Ill., for the most valuable paper of the year by a member—"Alum Treatment of Digested Sludge"—in *Sewage Works Journal*, Sept., 1941. (At this juncture we call attention to Mr. Sperry's article on "Experiences with Gas Engines at Aurora" which is featured in this same issue. So we might add this note—If ever the peruser finds an article with Sperry's name on it, read it by all means. Several have appeared in earlier issues of WATER WORKS AND SEWERAGE—the most recent being that in our issue of August, 1941. It describes the Aurora method of removing and disposing of air dried sludge from beds to stock pile at the least cost.)

In the Gadget Contest the awards were:

1st Place—Paul Brunner, Chemist, Fort Wayne, Ind. (A B.O.D. calculator that won the $5.00.)

2nd Place—Matt Kirn, Plant Supt., Waukegan, Ill. (A sludge level and sampling device—$3.00.)

3rd Place—Minn.-St. Paul Sanitary Distr. (A semi-circular blade for cleaning sludge pump plungers.)

Sludge Dewatering and Incineration Building
(Also in this building is the splendidly kept storeroom and a machine shop that is.)

C.S.S.W.A. Federation Cup Winner

H. W. Wisely, Secretary of the Sewage Works Federation and former Secretary of the Central States Assn., was on hand to present to the Association the silver cup which an accompanying picture shows being held by C.S.W.A.'s outgoing and incoming presidents. This cup was won for the best representative from any Association at the Second Federation Convention in New York City. But for the fact that the winner is computed on the basis of total man-miles of travel to the Convention, this record made in the home state of the large New York State Assn. would have put the N. Y. group to shame.

New Officers

President

Kerwin L. Mick, Chief Chemist, Minn.-St. Paul Treatment Works.

1st Vice-President

Don. E. Bloodgood, Supt., Sewage and Sanitation Works, Indianapolis.

2nd Vice-President

Dr. W. D. Hatfield, Supt., Sanitary District of Decatur, Ill.

3rd Vice-President

E. J. Beatty, Supt., Sewage Treatment, Neenah-Menasha, Wis.

Secretary-Treasurer

John C. Mackin, Supt., Sewage Treatment, Madison, Wis.

Federation Director

B. A. Poole, Chief Engr., Indiana Dept. of Health, Indianapolis. (On leave serving in the Sanitary Corps.)

Kiesner on Priorities

The regular sessions got under way with a splendid exposition on the whole priorities structure by well informed and wideawake Willard F. Kiesner, Priorities District Manager for W. P. B., Minneapolis. Space does not permit recounting all of the classes of orders and ratings mentioned by Mr. Kiesner, who stated that manufacturers were being limited to 30 to 45 day inventories in all critical and semi-critical materials. In some extreme cases 90 day supply is allowed, this being the limit and rare. On this score he emphasized how important it is for those ordering supplies or equipment to give manufacturers a sound rating number and as much information as may be needed to show for what purpose the material or equipment is to be used. This record clears the manufacturer or purveyor and allows replenishment of inventoried stock. For violations in producing on false or insufficient ratings the fine runs up to $10,000 and jail sentence of 2 years. Plants of wilful violators are closed with what is known as an "S" order, 54 having been issued prior to Mr. Kiesner's talk on June 18. He also pointed out that some manufacturers had been taking long chances in their wish to supply regular customers promptly before the orders were in proper shape with ratings shown to insure replenishment of inventory. In this the customer could be held unfair to his suppliers who were willing to take chances for him.

1st Vice-Pres. **Host No. 2**

Don E. Bloodgood, Supt., Indianapolis Treatment Works
(Starting as Third Vice-President, now has three legs on the presidency.)

W. H. Cropsey, Supt. of Treatment Works, South St. Paul, Minn.
(Operates a combination industrial and domestic plant on sewer rental paid by industry to the city.)

Mr. Kiesner, in reply to questions, stated that from his knowledge the A-2 rating allowed on pumping station equipment for water works did not apply to sewage. However, *Secy. Wisely* of the Sewage Works Federation replied to this interpretation by stating that he had been informed by a W. P. B. authority in Washington that the A-2 rating did apply to sewage pumping station maintenance and operation.

L. H. Enslow, in commenting on the fact that switchboard and automatic pump control equipment could then (June 18) only be procured on a rating of A-1-J or better, asked Mr. Kiesner how, in any event, could such essential equipment or replacement parts be procured even assuming A-2 applied to sewage works as well as water. The answer was that when the new A-1-J or A-1-K ratings had to be met by water or sewage works not benefiting from such, the only thing left to do was to file on a PD-1 form marking it EMERGENCY. He was very kind in offering every possible assistance to any operator or manager in his district who would come in or get him by 'phone in such instances. (It is now known that since July 1 the A-1-C rating has been given water works, and we understand, sewage also, for emergency orders. Also that such orders can be placed in advance when a replacement part is within a short time likely to be required. An actual breakdown or failure does not have to occur before the A-1-C rating can be used. However, in using this rating it is urged that a letter or note of explanation covering the necessity be attached to the order.)

In closing, Mr. Kiesner warned his audience that information or advice concerning priorities which came by word of mouth should never be taken as assured. Regardless of the authority giving spoken advice, be certain that it is confirmed in writing. While his office might help considerably to expedite matters, he could only go on written rulings and instructions, regardless of who said what down in Washington or elsewhere. In this direction his staff meets for 1 hour every morning to learn of wired changes in orders. Each member must also put in 2 to 5 hours of after-office reading to keep up with new developments.

All in all, the members were left with an assurance that those answers not readily available would receive prompt attention in the Minneapolis W. P. B. office and all possible assistance would be rendered any operator in difficulties or confused as to proper handling of matters under priorities control.

New Director **Prize Winner**

B. A. Poole, Chief Engr., Indiana State Dept. of Health
(Elected Federation Director.)

Walter A. Sperry, Supt., Aurora, Ill., Sanitary District
(Awarded the prize voted the best paper of the year.)

[For an open discussion on Priorities refer to the "Operators' Breakfast," which follows later.]

"An Analysis of Stream Pollution and Stream Standards" by George J. Schroepfer.

Mr. Schroepfer, in one of his characteristically well prepared and presented papers, tore apart many existing stream pollution and plant effluent specifications and standards as being unsupportable on fact and in many respects ridiculous when making a comparative study of the existing standards of the several state authorities. Seemingly the states follow one another like sheep in adopting effluent and pollutional standards that can be shown to lack in any originality of thinking and totally without adequate concepts of basic considerations and values. Economies had not seemed to have entered the picture and even technically most existing standards must be seriously questioned. He liked the

South St. Paul's Combination Domestic and Industrial Waste Treatment Plant

Amongst those looking over the plant the camera caught John Bessert of Chicago Pump Co.; David Backmeyer of Marion, Ind.; Paul White of Muncie, Ind. The fourth picture shows a slug of sludge being shot from the elevated pipe into the lagoon by a charge of compressed air, these shots being automatically spaced with varying rates of sludge accumulation.

Sessions

Here the first two shots show the attention being given WPB's Minneapolis district manager, W. F. Kiesner, doing an outstanding job of explaining and clarifying priorities orders as these apply to water and sewage works operation, maintenance and repair. The third shot, at the luncheon session, shows Dr. W. H. Judd, former medical missionary to the Orient, reviewing in rousing terms "What's Behind the Present Conflict in the Pacific." Nothing for Uncle Sam to be proud of here.

thought of the "C. O. D. values" (Costs of Disposal) introduced and advocated by Abel Wolman before the first meeting of the Sewage Works Federation and commented on the extensive waste of public monies because only "B. O. D." values had been considered rather than the "C. O. D." as an important factor when considering the overall returns from sewage and waste treatment. In brief, the condition of the individual waterway should determine whether the "C. O. D. values" might not well outrank the "B. O. D." yardstick which may or may not possess the significance so prevalently accorded this laboratory test and the doubtfulness of the mints of sampling procedures commonly followed in connection with this test.

Mr. Schroepfer took as an example of inability to give an adequate picture of the effectiveness or sufficiency of treatment the surveys of the Mississippi River below Minneapols and other streams. A study of the dissolved oxygen and B. O. D. results could give any picture desired, depending upon sampling point location and hour of the day sampling was practiced. Taking the summer months of June, July and August, variations in D. O. below the Twin Cities plant ran from 40 per cent below the median to 180 per cent above. The low figures being obtained between 8 and 10 a. m. B. O. D. values varied 16 per cent above to 25 per cent below the median for the day. Even 30 miles downstream fluctuations in D. O. ran 1 to 5. Apparently the most representative sampling hours were between sundown and midnight and the next between 7 a. m. and noon. Mr. Schroepfer's analysis also revealed the marked variations in results attained from cross sectional stream sampling. He pointed out that fluctuations increased, too, with the intensity of pollution.

Taking it all in all, there is an important reason for developing a dependable method of composite sampling of streams and effluents which will give a reasonably fair picture. The urgency of improved sampling is appreciated, said Mr. Schroepfer, when realizing the millions of dollars involved annually in sewage treatment, this expenditure hinging on sampling methods and laboratory analyses which present evidence indicates cannot be taken on their face value. And while high degree treatment was appealing to the sewage fraternity, there was the economics side to consider if real engineering is to be claimed in sewage disposal generally, and unless sanitary engineers and public health authorities are some day not to be shown up as wasters of the public's money.

Hosts

(All three from the Minneapolis-St. Paul plant)

Stanley J. Larsen, Mechanical Engr.
John C. Sager, Operating Engr.
Warren H. Sleeger, Operating Engr.

(The latter two gentlemen, being responsible for general arrangements, were chagrinned to have to stay back of Pearl Harbor and accept the good old trolley for guest transportation to the Twin Cities plant.)

For instance, said Mr. Schroepfer, when streams are able (by suppositions) to cope with a primary effluent, except perhaps for a brief period, why not begin with providing primary treatment and take other steps if and when primary treatment is proved lacking in adequacy when evaluating all of the factors to be considered—not the least being costs in relation to attainments and the general good. Considering the fact that primary treatment at ½ the cost of secondary treatment accomplishes considerably more per dollar cost in respect to stream benefits, resulting f om settleable and floating solids removal, than does secondary treatment, Mr. Schroepfer asks, why not give primary treatment a trial and take the next step when need is shown.

Dr. F. W. Mohlman, Chief Chemist, Chicago Sanitary District, remarked that he had concluded by 1919 that nothing short of hourly sampling would give a true picture of stream conditions. Further, the selection of the most critical points is of utmost importance. He was also of the opinion that judging stream conditions as D.O. alone was far less satisfactory than the B.O.D. test.

W. H. Wisely, Mgr., Urbana-Champaign (Ill.) Sanitary Dist., advocated a preliminary sampling station study for selection of the critical points. While with the Ill. Health Dept. a Proportioneers solution feeder pump mounted in a boat was employed as a sampling device.

"Educational Acceleration in Sanitary Engineering" by H. E. Babbitt, Professor of Sanitary Engineering, University of Illinois, Urbana.

Professor Babbitt's paper was read by W. H. Wisely. It constituted an interesting debate for and against the so-called "short course" or "short schools" for training water and sewage works men as compared to the "long course" given by colleges and universities. We regret our inability to add the polish which the professor's debating type of paper possesses. However, the substance of his analysis is that the "short course" is on a low plane of educational endeavor but appears to be a necessity for the time because there are an insufficient number of "long course" graduates available to fill the operator jobs. The danger of the "short course" is that the individual may secure a false impression as a result of the little knowledge he really obtains from

"Doc" W. D. Hatfield, Supt., Decatur, Ill., Sanitary Dist. (Second Vice-Pres. of the Assn.) and Leland Brodney, Supt., Sioux Falls (S. D.) Treatment Works

The Norwegian National Sangerfest got the spotlight. Feature of this annual convention of Norwegian singers of America is the choir of 1,000 male voices.

Frank Roe, Manager, Carborundum Co.'s sanitary sales, and C. C. ("Sweed") Larson, Chemist, Springfield, Ill., Treatment Works

(1) *W. W. Mathews, Gary, Ind., Supt., Sewage Treatment Works*
(2) *R. W. Frazier, Oshkosh, Wis., Supt., Sewerage Commission*
(3) *Clyde E. Williams, South Bend, Ind., City Engineer*
(4) *M. D. Lubratovich, Duluth, Minn., Supt. Sewage Treat. Wks.*
(5) *C. C. ("Jeff") Abplanalp, Chicago, Wallace & Tiernan Co.*
(6) *L. W. Hunt, Galesburg, Ill., Supt., Galesbury Sanitary Dist.*
(7) *Kenneth V. Hill, Chicago, Greeley & Hansen, Engrs.*
(8) *Henry A. Riedesel, Rockford, Ill., Chief Engr. and Mgr., Rockford San. Dist.*
(9) *James A. Drake, Austin, Minn., Supt. Sewage Treatment Wks.*

such annual short schools. The "short course" operators create tougher competition for the younger college men. But, said the professor, as "hay wire" an expedient as it is the short course appears to be necessary for the present. And, on the other hand, the refresher type of short course to amplify practical experience is permanently justified.

Professor Babbitt, in closing, remarked that politics have affected Sanitary Engineers less than any other branch of municipal engineering.

Interestingly, Germany and Japan have trained municipal engineers at the Government's expense—possibly a lesson to us in America.

Operator's Breakfast

The "Operators' Breakfast" consisted of a three hour discussion period around the breakfast table.

The session was opened by some comments on **"The Sewage Plant in Civilian Defense"** from Major William Carey, O.C.D., Chicago. The following suggestions were made. (1) Be certain that your telephone lines are not amongst the 80 per cent to be inoperative during an air raid. (2) Secure proper identification insignia so that you may operate in a black-out. (3) Determine the most vital parts of your facilities and prepare plans of what to do if any are knocked out. (4) Provide all necessary repair parts and scatter your stores at strategic points. (5) Make certain of emergency transportation. (6) Rehearse repairs in a black-out and, above all, (7) Cooperate with the office of Civilian Defense and Defense Operations.

A discussion on charges made for sewerage service to military camps, Defense Plants, etc., which revealed that Sioux Falls, S. D., charges a nearby camp for sewerage service at the rate of 4 cts. per capita per month (48 cts. per year) while Rockford, Ill., gets 43 cts. per capita per year for Camp Grant. Eau Claire, Wis., charges $40.00 per million based on metered water used.

In a discussion of the effects of pollution by war industries, Dr. Mohlman had been in investigating some cases of stream discoloration. He concluded his remarks by saying that the effects were for the duration only, and in his opinion there appeared no sufficient grounds for imposing burdens which may slow down war production at this juncture.

A discussion on the deferrment of sewage plant personnel ended in a "draw"—some contending that deferrment requests were justified while others thought that the plants could be operated with something of a skeleton force and the younger men should not be held back. Further, the laboratory was not essential in sewage works operation and laboratory workers could be spared for the duration.

Priorities

Priorities proved the livest topic of the session, as to be expected.

W. H. Wisely, Secy. of the Sewage Works Federation, reported that W.P.B. considers sewage facilities in the same general category as water supply. The A-2 rating for sewage pumping stations has been honored. As to keeping inventories up to date, Mr. Wisely said that all sewage plants should start it if not already a practice. Inspectors from W.P.B. are certain to ask for the inventory record. If you get into difficulties call in your State Sanitary Engineer for assistance. If in doubt about a rating use the PD-1 application form, supported by a full statement and be able to prove that the material or equipment is essential and that substitution of less critical materials is not practicable.

In answer to questions Mr. Wisely said that the A-5 rating applied to the sewer system proper, as it did to the distribution system in water works. The A-2 rating applied to pumping in water and sewage alike —also to chlorine and all other "must" items in sewage treatment.

As to inventory keeping, a show of hands revealed that only a few in the group had been doing so. Wisely urged that all do so, and be ready to supply W.P.B. with a complete listing of materials and equipment purchased during recent months.

Asking those present if any difficulties had been experienced in procuring equipment or supplies—apparently none had.

L. H. Enslow said that he wished to add a word to Mr. Kiesner's remarks about protecting the supplier of critical materials. If only the operator would write a note of explanation of the use and importance of the item ordered it would serve as highly useful to the supplier required to account for the use of all materials shipped in order that he may secure the needed rating in replenishing his supply of raw materials. In case a PD-1 application is required the supplier will know it from the explanation accompanying the order.

Personnel and Property Protection

In discussing this topic a show of hands revealed that only two plants represented had completed the filling of F.B.I. personal history forms for the record.

In the direction of plant protection, Springfield and South St. Paul have watchmen on 24 hour duty with time-clock stations. Oshkosh, Wis., has a system of reporting hourly at night to the police station. If no report comes through a police car is sent to the plant. Indianapolis with 142 acres of grounds has city police guards requiring eight policemen. Seemed both expensive and is not adequate if guarding is really needed, said Mr. Bloodgood. Now two police are used and an employe for identifying those who belong on the property. Minneapolis is on the alert, has stopped visiting, keeps doors locked and is floodlighted.

Laboratory Methods

Considering the best crucibles for suspended solids and ash determinations one operator reported using Johns Manville "Sealite" filtering aid on top of the asbestos matter in Gooch crucibles. Also a disc of filter paper under the asbestos had been

M. C. Peterson, Bimidge, Minn., and E. C. Slagle, Duluth, Minn., District Engrs., Minn. State Dept. of Health

Wilfred Cheadle, Minneapolis, Operator, Twin Cities Plant, and S. B. Herzig, Ronville, Minn., Chief Plant Operator

F. E. Davis, Aurora, Ill., American Well Works, and Matt Kirn, Waukegan, Ill., Mgr. Sew. Treatment Plant (No. 2 gadget prize-winner)

Paul L. Brunner, Fort Wayne, Ind., Chief Operating Chem. (His gadget won first prize) and David A. Backmeyer, Marion, Ind., Supt., Sanitary Dist.

John E. Bessert, Chicago, Chicago Pump Co., and Paul R. White, Muncie, Ind., Supt. of Sewerage

used to good advantage. Dr. Hatfield at Decatur uses centered glass crucibles where ignition (ashing) is not to be employed. These glass crucibles had proved very satisfactory.

Minneapolis-St. Paul Plant Practices

Just prior to the inspection trip to the Twin Cities and South St. Paul plants a group of papers were printed on practices at these two plants.

"Plant Operation" by John C. Sager, Plant Operator, Minneapolis-St. Paul Sanitary District.

Mr. Sager in presenting operating highlights of the past four years.

In crude sludge conditioning in vacuum filtration, a 4 minute air mix proves best and the addition of ferric-chloride and lime thereafter is better than the reverse. Filter cloth washing was improved by setting the spray jets at right angles to the face of the drum. At intervals the cloths are washed in place with inhibited muriatic acid in the sludge pan. A combination of improvements has increased the service per cloth from 179 hours to 450 hours. Ferric chloride had been reduced from 4 per cent to 1 per cent at present. By operating more filters and maintaining a thinner cake 3/16-in. operation economy had resulted. The Buchner funnel test had been abandoned. Chemical reduction had come about mostly by careful watching for sludge changes and teaching operators to use the "slip-stick."

Incinerators of the multi-hearth type now have larger rabbling teeth and better water cooling. Placing operating responsibility on a single man had brought about greater efficiencies.

Mr. Sager commented on a new ferric chloride pump of the squeegee type recently purchased.

George Schroepfer in further commenting stated that just about $100,000 in operating costs had been saved by gradually reducing the cost of sludge disposal from $6.80 per dry ton to $3.27. Chemical costs alone had been reduced from $300 per day to $80. Incinerator preheaters had been eliminated, saving maintenance expense and $5,000 annually for power alone.

"Application of Laboratory Data to Plant Control" by K. L. Mick, Chief Chemist, Minneapolis-St. Paul Sanitary District.

Mr. Mick stated that careful keeping of sludge solids through the plant had been most helpful and revealing. It has been shown that crude sludge concentration had its limitations in producing economy. Stale sludge required more chemicals in conditioning than the thinner and more fresh sludge. The pH of stored (thickening) sludge should never be held long enough to drop below 5.9 or 6.0.

Filter cloth binding had been traced to use of too much lime in conditioning—now reduced to 4.7 per cent on dry basis. Also the lime had been responsible for rapid incrustation of conditioned sludge limes, cleaned with sewer cleaning tools and inhibited muriatic acid (300 c.c. of analine oil to a carboy of 18 per cent acid in 600 gals. of water—for a full description of the method see Mr. Mick's paper in our July issue). The same acid is used for removing calcium deposits from filter cloths. These deposits had been found to be 85 to 93 per cent $CaCO_3$; 3.8 per cent grease and the balance silica and iron. Deposits after reduction in lime dosage were 24 per cent grease and 68 per cent $CaCO_3$. After acid bath, deposits remaining were 64 per cent grease and 22 per cent $CaCO_3$.

In commenting on the "Solids Balance Sheet" for the Minneapolis plant Mr. Mick revealed that they were now able to reduce the discrepancy between laboratory findings and plant operating data to a difference of only 2.8 per cent. This was much better than most plants had reported and entailed 24-hour continuous sampling of sludge, supernatant, vacuum filtrate—using total solids. Chemicals added had to be deducted from weight of sludge cake.

"Treating Packinghouse Wastes and Domestic Sewage at South St. Paul" by W. H. Cropsey, Supt. of Treatment Works, South St. Paul, Minn.

Mr. Cropsey's interesting plant, designed for 10 m.g.d., treats 8 m.g.d flow, of which 90 per cent or better is packinghouse and stockyard wastes and 5 per cent is domestic sewage. Operating costs are met by the industry which receives the bill and pro-rates it amongst themselves.

Grease recovered by skimming (no air blowing) is sold at a profit. Sludge, consisting largely of the contents of the animal's paunch, is lagooned (see accompanying pictures showing an air-shot of sludge entering the lagoon). The primary tanks, providing 30 min. settling, are followed by paddle wheel flocculators, providing 45 minutes of mechanical floc building without chemicals. Thereafter comes a 1½ hour settling ahead of 6 circular trickling filters of 6 ft. stem depth and 1.26 acres area. Final clarification of 1½ hrs. completes the job. The filters are back washed with air and effluent at 2 to 4 week intervals. The dirty water is stored and gradually fed back through the plant. The plant effluent is of the strength of the average domestic sewage. Daily peak flows reach 18 to 20 m.g.d. The B.O.D. of the raw sewage is 1,500 reduced to 900 in the primary and intermediate stages ahead of the filters. The final effluent averages 360 B.O.D. The annual operating budget is $60,000, 90 per cent of which is contributed by industry and the balance is covered by a sewer rental of 10 per cent surcharge to water bills.

It is with regret that space limitations prevent reviewing the paper on "Plant Maintenance Practices" by S. J. Larson, Mechanical Engr. of the Twin Cities plant. Mr. Larson's valuable paper will, however, be printed in full in our October issue.

THE PROTECTION OF WATER SUPPLIES DURING EMERGENCIES

By W. L. MALLMANN
MICHIGAN ENGINEERING EXPERIMENT STATION
EAST LANSING, MICH.

IN MODERN war there are no definite fighting fronts. Air raids are possible in any area, even at points remote from the borders of a country. Civilian defense measures are necessary irrespective of location. The civilian population must be prepared for any eventuality that may result from bombing, invasion, population relocations or any other situation that may arise as a result of warfare.

You who are responsible for the operation of our municipal water and sewage systems should be fully trained for any emergency that might endanger our water supplies or interfere with our sewage disposal systems. This paper is not a listing of specific directions for handling emergency situations, but is presented largely to acquaint the water and sewage plant operators with some principles of disinfection that must be considered in emergency water disinfection where fresh sewage has contaminated the water supply.

Reports from England indicate that bombs landing in streets have frequently destroyed water mains and sanitary sewers. In many instances the water mains have been badly contaminated. It would appear that the English have had little difficulty in pollution of water supplies as a result of frequent bombing. We have no reason to believe that the reports we have received are not true, but we should not accept these reports as a guarantee that pollution would not result in our country. We must face the problem of sewage pollution of our water supplies as we understand pollution and we should take every precaution that we know of to be sure that disease transmission does not occur Let us examine the problem of sewage pollution from the facts that have been obtained from researches on water and sewage.

The first point we must consider is a definitely proved fact, that sewage contains disease-producing bacteria. Such diseases as typhoid fever, bacillary dysentery, diarrhea and amebic dysentery have occurred in epidemic form when sewage has contaminated the water supplies.

The Author

The incidence of disease-producing bacteria is greatest in fresh, raw sewage. As the sewage progresses through the sewage collecting systems, the disease-producing bacteria die rapidly because they find sewage an unsatisfactory medium in which to grow or in which to live. The putrefactive bacteria develop rapidly in the sewage making conditions increasingly unfavorable for the disease-producing bacteria. Many pathogenic bacteria die after a few hours' exposure in sewage. Some survive, however, as evidenced by the fact that epidemics of typhoid fever have been caused by water polluted by sewage introduced into a stream at a considerable distance from the point of the epidemic. It is important to remember that fresh, raw sewage is relatively much more dangerous than is sewage that has become septic or sewage that has passed through a modern sewage disposal system.

Difficulty of Complete Disinfection of Sewage

The first point that must be very seriously considered is the fact that it is nearly impossible to disinfect fresh sewage to a point where all disease-producing bacteria have been destroyed. Fresh sewage is characterized by the presence of numerous particles of fecal matter. These particles are masses of bacteria covered by a coat of organic matter. In order to destroy all the bacteria in the mass, it is necessary that the disinfectant penetrate through the mass to the center. Few disinfectants have the property of penetration. Hence, the possibility of chemical disinfection is slight. Mallmann and Chandler (1) proved that hypochlorites even in high concentration were unable to sterilize small particles of fecal matter. After an exposure of 15 minutes coliform organisms were still present.

A survey study of the effectiveness of chlorine in disinfecting a sewage effluent from sedimentation tanks was made by Mallmann and Shephard (2). The effluent from a primary sedimentation system, although fairly clear, still carries considerable suspended solids in the form of fine particles. These particles are masses of bacteria and organic matter. If the chlorine dosage were sufficient to care for the chlorine demand of the sewage and still leave an excess, then all of the vegetative cells such as the coliform bacteria would be destroyed providing the chlorine was able to penetrate the suspended particles in the sewage effluent. That such is not the case is shown in Table I. The percentage reduction is frequently 99.9 and in many instances it is better than 90 per cent but the surviving number of coliform organisms range from a minimum of 10 to a maximum of 100,000 colon index. In every case a chlorine residual from 0.1 to 4.0 p.p.m. was maintained for 20 minutes. Inasmuch as the coliform organisms were not completely destroyed, certainly a water containing particulate sewage would not necessarily be rendered free of health hazards by chlorination even though excessive dosages were used. A chlorine residual in water containing fresh sewage pollution does not necessarily mean freedom from pathogenic bacteria. It must be remembered that chlorine is distinctly a marginal disinfectant in the presence of bacterial clumps and water containing particulate matter.

The third point that must be con-

sidered in handling emergency breaks in water mains is the fact that, where a broken water main and a broken sewage line exist in a bomb crater, sewage pollution must result. The closing of valves adjacent to the break allows the water main to drain and allows sewage to diffuse into the lines for a considerable distance. The extent of the pollution would be determined largely by the size of the main, location in the crater and the drainage of the crater through the broken sewers. In many instances fresh, raw sewage carrying potentially many pathogenic bacteria, protozoans and viruses protected by coverings of organic matter and bacteria can enter through the break into the water main. When repairs are made, there is no practical way of eliminating this pollution and, even though local disinfection were possible, there is no way to know whether all pollution has been removed. In emergency repairs of water mains where sewage pollution is even remotely possible the local treatment of the water should always be done on the premise that pollution has occurred.

easily killed by heat. Mallmann and Devereux (3) obtained the following temperatures and times of exposure for the killing of representative types of disease-producing bacteria carried by polluted water. Large numbers of bacteria were exposed so that the temperature and length of exposure are probably higher and longer, respectively, than would obtain under conditions of accidental contamination of water supplies. A summary of the data follows:

Exposure to temperature of 54° C. (130° F.):

Staphylococcus aureus—survive 10 min.
Escherichia coli—survive 20 min.
Eberthella typhosa—killed 1 min.
Streptococcus fecalis—survive 20 min.

Exposed to temperature of 60° C. (140° F.):

Staphylococcus aureus—killed 5 min.
Escherichia coli—killed 5 min.
Eberthella typhosa—killed 1 min.
Streptococcus fecalis—survived 10 min.

Exposure to temperature of 65° C. (150° F.)

Staphylococcus aureus—killed 30 sec.
Escherichia coli—killed 15 sec.
Eberthella typhosa—killed 15 sec.
Streptococcus fecalis—survived 3 min.

TABLE I

The Disinfecting Action of Chlorine on the Sewage Effluent From a Sedimentation Tank.

(Traverse City, Michigan)

(T denotes thousands. M denotes millions.)

	Chlorine Residual	Influent		Effluent					
				7 Minutes		14 Minutes		20 Minutes	
Series	PPM.	Count	Colon	Count	Colon	Count	Colon	Count	Colon
24	4.0	1240T	1M	3T	10T	200	10	60	10
18	3.5	330T	10M	46T	100T	8T	100T	300	1T
17	2.0	340T	1M	11T	100T	3T	10T	250	1T
25	2.0	890T	1M	5T	100T	600	10T	200	100
29	2.0	1400T	1M	43T	1M	40T	100T	300	1T
40	1.6	1200T	100T	10T	1T	2T	100	1500	10
19	1.25	280T	10M	33T	1M	61T	1M	51T	100T
28	0.5	420T	10M	5T	10T	3T	1T	150	100
26	0.7	625T	1M	2T	10T	3000	1T	100	1T
42	0.4	850T	100T	360T	10M	200T	1M	100T	100T
41	0.1	900T	1M	150T	1M	120T	100T	50T	100T
27	—0.25	350T	1M	6T	100T	400	1T	700	10T
23	—1.5	640T	1M	36T	1M	2500	100T	100	10T
21	—2.0	556T	1M	23T	100T	25T	1M	23T	100T
22	—2.5	616T	10M	76T	10M	15T	1M	3T	1M
20	—3.5	840T	10M	81T	10M	19T	1M	100T	1M
43	—7.0	550T	10M	270T	10M	150T	10M	90T	1M

Heat Disinfection Positive

The fourth point to consider is the fact that heat disinfection is an effective method of destroying disease-producing organisms in water and sewage, irrespective of the extent or nature of the sewage pollution. Heat will penetrate any type or size of particle and destroy all living organisms within the particle providing, of course, that the proper temperature and the proper length of exposure are used. The most common types of disease-producing bacteria found in sewage and water are

Exposure to temperature of 71° C. (160° F.)

Escherichia coli—killed 15 sec.
Streptococcus fecalis—killed 60 sec.

These data show that the type of disease-producing bacteria common to sewage were killed at temperatures even slightly less than the pasteurizing temperature for milk. If drinking water were brought to boiling temperature, all public health hazards would be removed irrespective of the amount or kind of organic matter that might be present as a result of sewage pollution.

Suggested Procedure

On the basis of the above facts the following procedure is suggested for the handling of water that may have received fresh sewage pollution:

1. Depend upon excess chlorination and boiling for safety of water supply.

2. Order boiling of water for drinking purposes from all household connections for one day following repair.

3. Introduce hypochlorite powder in main at point of break. Most of this powder will move with the first flush of water through the main but so will most of the heavy pollution. Thus, considerable destruction of the disease organisms present will result. The powder is best applied in the form of a thick cream by smearing or "whitewashing" the interior of the pipes.

4. Fill main with water and allow to stand for 20 to 30 minutes for the chlorine to act.

5. Where possible also attach emergency chlorinator to supply back of break so that chlorine water will pass through the repair part. Dose heavy, at least 10 p.p.m. available chlorine, to be sure that the chlorine demand of the water is satisfied and an excess of chlorine remains in the water.

6. Flush main thoroughly from nearest hydrant beyond break.

7. Flush all connecting mains adjacent to break.

8. After flushing the main, continue emergency chlorination at a rate of 1 part per million available chlorine for the entire system until all danger has been eliminated. If bacteriological samples show pollution, when normal treatment has been restored, high chlorine residuals should be re-established and all polluted areas should be flushed.

9. Bacteriological samples should be used only as a check on chlorination. In no case should chlorination be discontinued until after negative bacteriological samples are obtained.

10. All emergency auxiliary supplies, such as wells, reservoirs, etc., should be chlorinated irrespective of location or source. Where possible all supplies should be inspected by a representative of the Department of Health.

References

1. Mallmann, W. L. and W. L. Chandler, "The Disinfection of Avian Fecal Material," Jour. Am. B. M. Assoc. 36; 190, 1933.

2. Mallmann, W. L. and W. F. Shephard, unpublished data.

3. Mallmann, W. L. and E. D. Devereux, unpublished data.

THE HOME FRONT
must have strong supply lines, too

In the shadow of enemy wings lie the water supply lines in a thriving community. First an aerial reconnaissance photograph. Later a target!

Today, on the home front, it is the duty of every responsible official to select the strongest pipe lines under the sun. Lock Joint Reinforced Concrete Pipe is included in the specifications for the majority of all large diameter water pipe contracts in the United States. Resistance to great shock, heavy loads and vibration is built into each length of this steel-cored, steel-reinforced, concrete walled pipe. Ability to withstand earth movement and deformation is assured by the self-caulking flexible expansion joints. The construction and design make Lock Joint Pipe your safest, surest investment today—yet Lock Joint Pipe uses less of those essential materials so necessary to our War Effort. Whether your project is large or small, your 'phone call, telegram, cable or letter to any of our offices will bring a prompt reply.

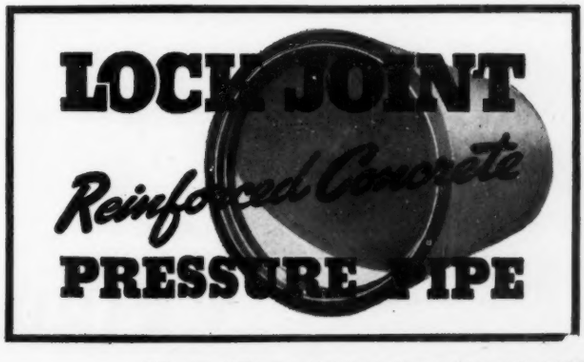
LOCK JOINT PIPE COMPANY

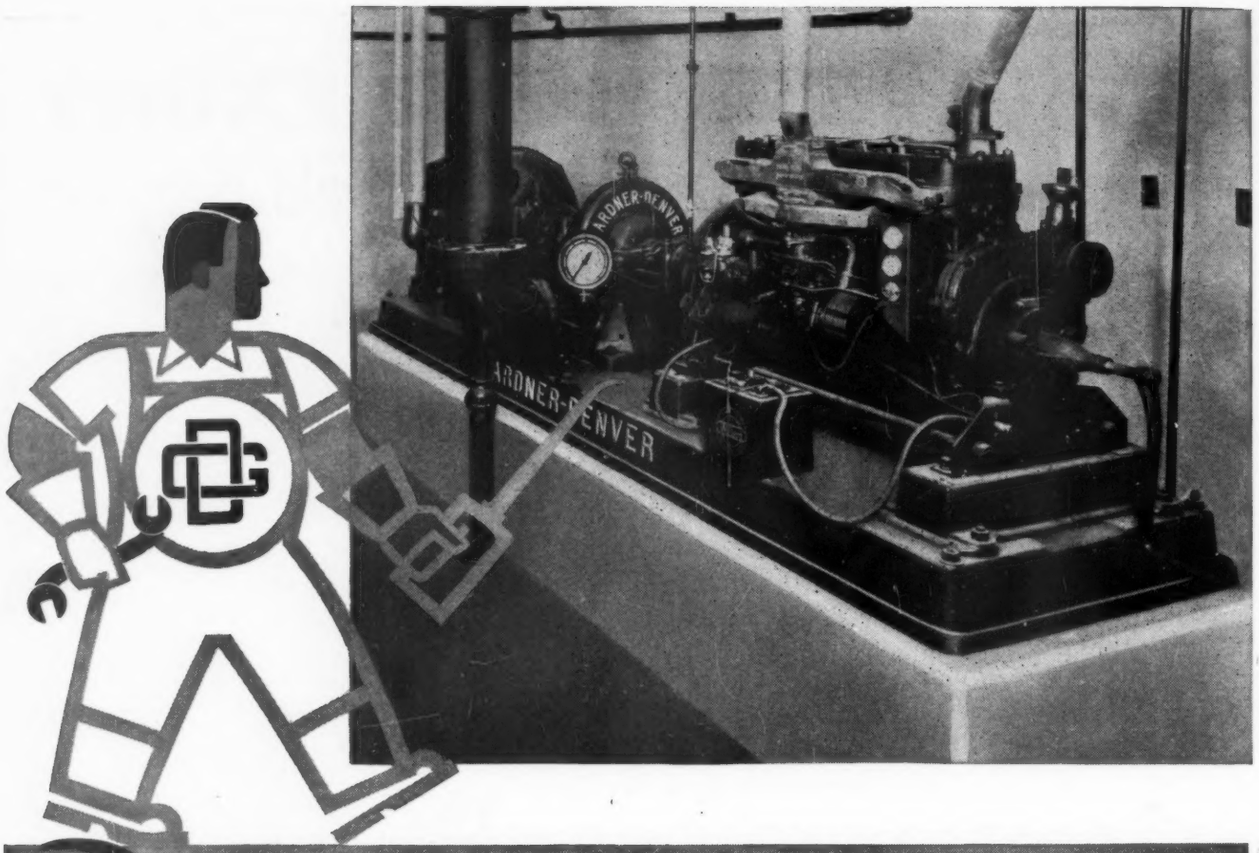
Established 1905

AMPERE, NEW JERSEY

Denver, Colo. • Chicago, Ill. • Kenilworth, N. J. • Kansas City, Mo.
Rock Island, Ill. • White Plains, N. Y. • Valley Park, Mo.
Cleveland, Ohio • Hartford, Conn. • Navarre, Ohio

SCOPE OF SERVICES — *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*





Do This Now..

● Today, it's a patriotic duty—as well as an economic necessity—to care properly for centrifugal pumps, so that they will give uninterrupted service throughout the war emergency. Here are some Gardner-Denver pointers on keeping your present pumps running in top-notch form:

1. Inspect the pump regularly during operation.
2. Keep the pump and drive in perfect alignment.
3. Thoroughly clean ball bearings every three months—and lubricate with regular ball bearing grease.
4. Adjust packing glands so that a slight amount of water helps lubricate the pump shaft at the packing joints.

AND PLAN FOR THIS ··

● The experience of many waterworks engineers proves that Gardner-Denver Double-Suction Centrifugal Pumps are truly modern centrifugals that fit into your plans for increased pumping efficiency. Here are the special features that enable these pumps to lower cost per thousand gallons pumped:

1. Every modern hydraulic and mechanical feature that increases efficiency at lower power cost.
2. Casings, impeller and other vital castings of Gar-Durloy—the modern high strength cast iron developed by Gardner-Denver metallurgists.
3. Large, smooth waterways prevent eddies and cross currents.
4. Heavy duty, single-row ball bearings absorb line and thrust loads.

GARDNER-DENVER PRODUCTS HELP SPEED VICTORY

Gardner-Denver Double-Suction Centrifugal Pumps are designed for heads up to 350 ft. For complete specifications, write Gardner-Denver Co., Quincy, Illinois

GARDNER-DENVER *Since 1859*

ADVANTAGES OF CAREFUL PROGRAMMING OF SLUDGE TRANSFER

Demonstrated in Studies at Rutherford, N. J.

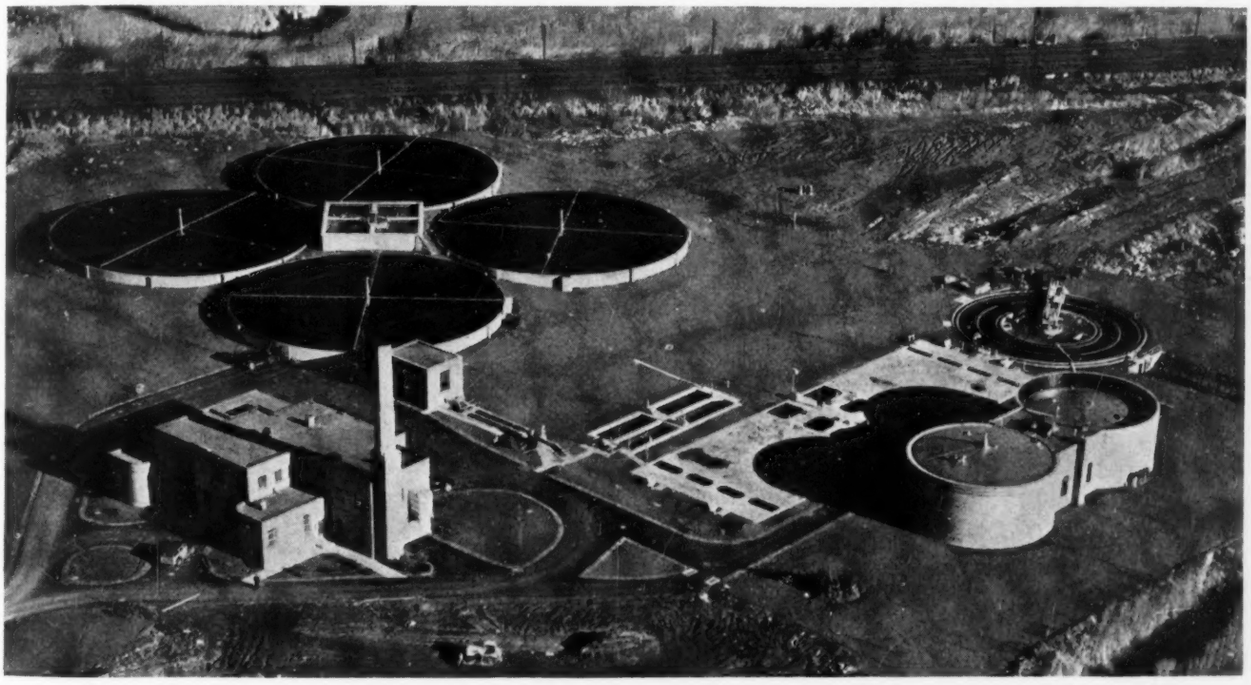
By ALBERT B. KOZMA
Superintendent
THE JOINT MEETING SEWAGE
TREATMENT PLANT
RUTHERFORD, N. J.

THE Joint Meeting Sewage Treatment Plant of Rutherford, East Rutherford and Carlstadt, N. J., receives the industrial wastes as well as the domestic sewage originating in these three communities. To cope with the industrial wastes, which by volume constitutes about 33⅓ per cent of the combined flow, the plant was designed as a combination chemical precipitation and biological (trickling filter) plant and subject to operation as a chemical or biological plant or with the two processes in series, to meet conditions and effluent quality requirements. On the end of the plant is a mechanical sand filter (strainer) of the automatic self-cleansing type. A full description of the Rutherford Joint Meeting Plant was published in the April, 1941, issue of WATER WORKS AND SEWERAGE.

The Author

It was realized that the combined industrial and domestic sewage was to impose a high settleable solids loading on the plant (400 to 450 p.p.m.) and provisions were made in the design and equipment to meet the situation. The plant is equipped to provide sludge digestion, normally, and vacuum filtration. Uultimate disposal is by incineration of the sludge cake. At will, the digestion stage may be eliminated and raw or chemical sludge sent direct to the dewatering filters preparatory to incineration, or other disposal if deemed desirable. Even with the relatively large volume of sludge, in consequence the plant is always capable of its handling and complete disposal without any real problem having presented itself.

As with any treatment plant the matter of the most effective and overall method of handling and transferring sludge had to be worked out. In the breaking-in period we had to develop a procedure and program of properly collecting the sludge so that neither the Dorr Monorake Sludge Collectors nor the sludge digesters became overloaded. Our efforts to improve the methods of sludge collection resulted, simul-



General View of the Joint Plant Serving Rutherford, East Rutherford and Carlstadt, N. J.

Combined industrial and domestic sewage enters the plant at the small screen house between the trickling filters and the filter and incinerator building attached to the administration and laboratory building. Following the grit chambers and Parshall flume are the twin rectangular flocculating chambers. The covered tanks in front of the digesters are Monorake equipped primary clarifiers, which in an earlier plant were deep plain settling tanks. Beyond is the self-cleansing municipal mechanical sand effluent filter.

taneously, in a better clarifier effluent, thereby improving the operation of the whole plant as well as the digesters.

Procedure of Proper Sludge Collection Developed Through Study

The primary sludge is collected in two clarifiers, each 84 ft. 6 in. long, 28 ft. wide, of 2,360 sq. ft. area, provided with an 80 cu. ft. sludge hopper. The sludge hoppers are near the influent ends of the tanks, on their center lines, and the floor slopes toward them from the sidewalls.

Before establishing a sludge pumping schedule a series of tests were run to determine the suspended solids content of the clarifier influent and effluent. We found that the average amount of suspended solids removed by the primary clarifiers was 375 p.p.m., amounting to 7,300 lbs. of dry solids when the flow averaged 2½ million gallons per day. We also found that the clarifier sludge had an average solids content of 5 per cent, so that a total of 21,000 gallons of sludge had to be pumped daily.

These laboratory estimates were verified in the plant. Due to the fact that the sludge collectors are provided with overload switches, which indicate the slightest amount of excess sludge, it was easily established that the amount of sludge was approximately correct.

There are two Dorr Monorake Sludge Collectors in each tank. These are drawn in opposite directions by means of a motor and cables (see line drawing). Each collector makes a full circuit in 40 minutes, therefore a fresh batch of sludge reaches the sludge hopper every 20 minutes.

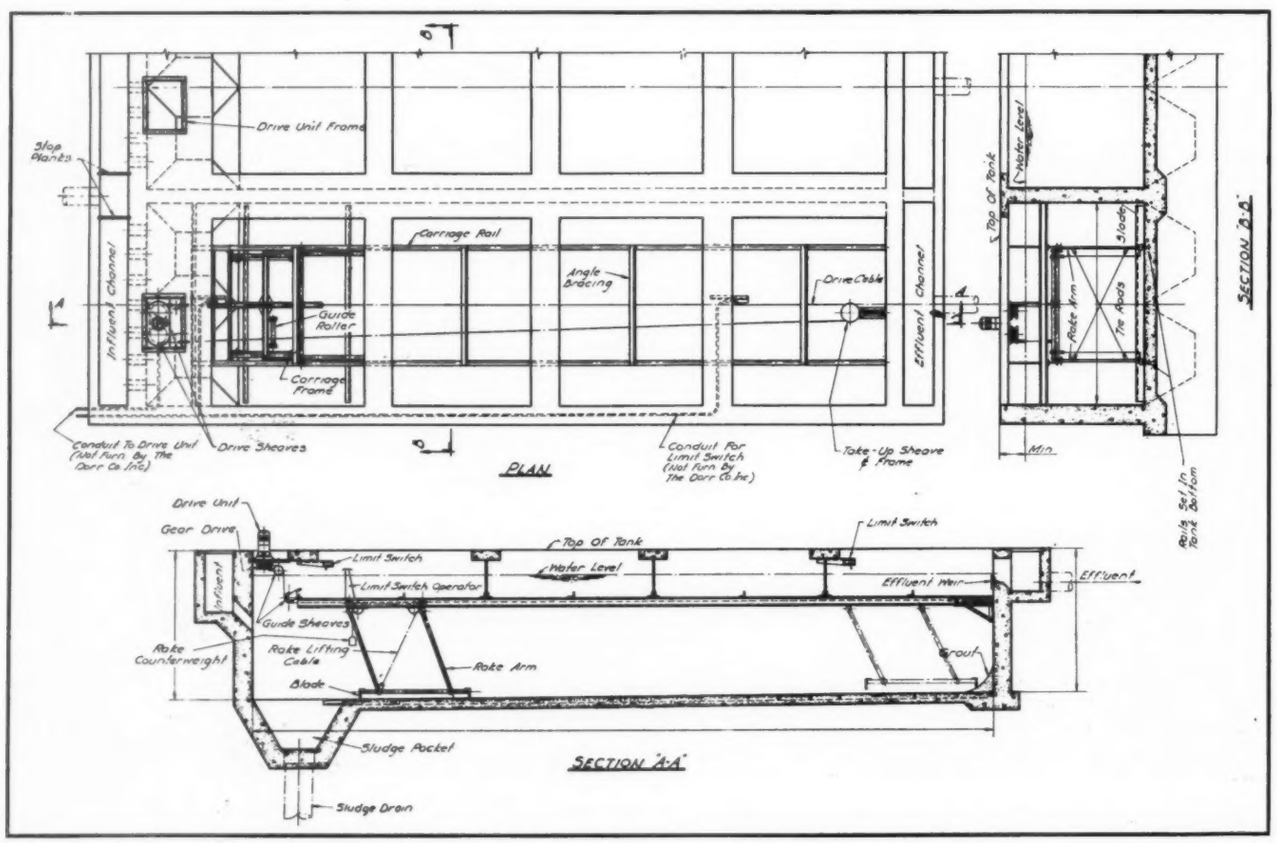
Employing three operating shifts we pumped sludge three times a day, 7,000 gals. each time—i.e., 3,500 gals. from each tank. For convenience the sludge pumps were adjusted so that the rate of pumping was 3,500 gals. per hour.

We found that it took 20 minutes to exhaust the sludge from the hopper and the adjacent sloping floor area, by which time a new batch of sludge was delivered by one of the collectors. Twenty minutes later another batch arrived, fully exhausting the concentrated sludge in the bottom of the tank.

By alternating the pumping time half hourly between the two settling tanks denser sludge was obtained.

Recently a further refinement was introduced by regulating the length of pumping in proportion to the settleable solids indicated in the previous 24 hrs. composite sample. We found that approximately 1,000 gals. of 5 per cent sludge is available for pumping per c.c. of settleable solids. Multiplying this figure by the number of c.c.'s and the amount of flow in 24 hrs., the amount of sludge to be pumped is obtained.

In all these investigations it proved to be a great satisfactoin that the Monorake Sludge Collectors not only responded quickly to the sludge load variations but that they actually indicated the depth of the sludge blanket. They are provided with a spring type overload switch which indicates the degree of tension in the hauling cables; this tension in turn is proportionate to the depth of the sludge. We found that the most satisfactory operation was obtained if this depth was kept around 6 inches.

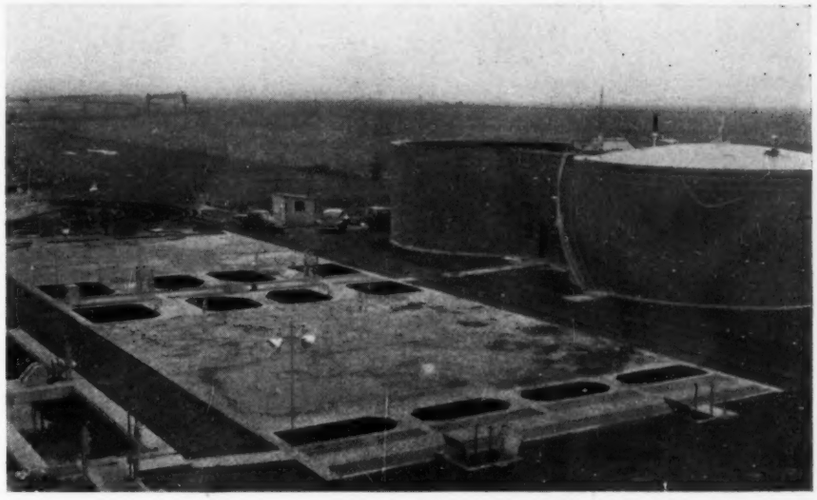


The Dorr Monorake Sludge Collectors of the Type Installed in the Primary Clarifiers

(Note—This is not a drawing of the Rutherford clarifiers but was substituted because the absence of detail better shows the collector mechanism.)

New Rapid Method for Sludge Solids Determination Marked Help

A great number of sludge solids determinations had to be made during our investigations and the simplified rapid method proposed by Dr. Symons of the Buffalo sewage plant proved to be of great value. Two methods are available, one to be performed with a centrifuge and the other by determining specific weights. These methods were described in the June, 1941, and January and April, 1942, issues of WATER WORKS AND SEWERAGE—the last also being reproduced in the Reference Section of the June, 1941, issue.



View of the Flocculators (left); Primary Clarifiers and Digesters

Effects of Sludge Collection Control

The control of sludge collection through programming of collector mechanisms, and sludge pumping cycles proved beneficial in several ways:

(1) In the beginning when the sludge digesters could take a limited load it helped us to determine in advance how much of the crude sludge to handle by means of the vacuum filters direct.

(2) It resulted in maintaining fresh sludge in the settling tanks. It also prevented some other difficulties arising if sludge is left in the tanks, namely, a reduction in the cross section area of the tank, with an accompanying shorter detention time and scouring some of the sludge into the tank effluent.

(3) It increased the efficiency of the settling tank for reasons mentioned in the preceding paragraph, and the amount of suspended solids, oxygen consumed and biological oxygen demand were greatly reduced in the effluent.

Conclusion

We found that by utilizing the simple tests required by the State Department of Health and by making a few elementary calculations based on the tank dimensions, capacities of sludge sumps and the speed of blade travel on the Monorake collectors, a schedule of programmed operation could be established which proved beneficial in increasing the operating efficiency of the settling tanks and markedly reduced the undesirable water (sewage) pumped into the digesters in the form of too thin sludge and/or break-through water resulting from a too shallow blanket of sludge above the pump suction.

Copper Treatment of Sewers Does Not Injure Trees

Inquiries coming in to us concerning the possible death to wanted trees when copper sulphate is applied to sewers for the purpose of killing intruding root growths which choke sewers, led us to question the operator who we believe has employed the treatment longest.

In reply to our questions, Mr. J. W. McAmis, Superintendent of water and Sewerage at Greenville, Tenn., states that there has never been noted any permanent or visible injury to trees since employing the copper sulphate method every summer for the past several years.

The explanation seems to be that only that root which finds entrance into the sewer is killed and that the tree is not dependent upon these intruding roots as its sole source of nourishment or moisture. It is also probable that the root is not injured beyond the wall of the sewer, for the growth re-establishes itself in time and must be destroyed again the following year or perhaps two years later.

Mr. McAmis points out further that their difficulty at Greenville has been that of applying the copper sulphate in a manner to have the sewer blocked sufficiently so that it flows full and to add sufficient of the copper salt to insure a high enough concentration for a period of contact sufficient to kill the single lead in root tendril on which grows the large bush of hair roots that block the sewer. It is necessary to kill that lead in root so that the weight of the brush end will cause it to part at the sewer wall, and the brush then travels down to the sewage treatment plant unless there is another blockage to stop it somewhere along the line.

We are printing this at root-killing time because some interested operators have expressed fears of consequences if trees are permanently damaged. Also because there is a definite trick to the method which involves the requirement of a full flowing sewer for top root intrusions and ample concentration of copper to do the job effectively. What the minimum concentration and contact period is has never been developed. The answer would probably be a different one for the various types and species of roots, so the formula would seem to be to add "plenty" in the first treatment and reduce by degrees until the results are not satisfactory and thereafter step up the dosage in the subsequent treatments.

If anyone has developed an answer as to how much copper sulphate for an estimated flow and for how long a period of contact to kill the better part of the roots, we shall be most happy to receive the data for publication.

Eggebrecht Retires After Serving Milwaukee Water Department for 49 Years

After completing a 49 year tenure of service in the Milwaukee Water Department, Ernest C. Eggebrecht will retire on Sept. 16th. On Sept. 20th he will celebrate his 70th birthday and the compulsory retirement age.

Mr. Eggebrecht, who has been chief engineer of Milwaukee's pumping stations, will receive a comfortable pension of approximately $3,000 per year.

Save, Stretch and Share!

(A War-Winning Formula)

WHILE no editor likes to be referred to as a "shears and paste pot artist," at the risk of being branded as such, the writer is scrapping in part what was planned for this page and consigning the second item concerning salvage of rubber products from sewage to another page.

The above heading will be familiar to those members of the American Water Works Association who have read the recently distributed pamphlet from the A. W. W. A. office bearing a similar caption and printed over the names of President Abel Wolman, Past President L. R. Howson, now Chairman of A. W. W. A.'s Committee on Wartime Water Works Practice, and Secretary Jordan. Without question this worthy outline of suggestions on "Saving, Stretching and Sharing" for the winning of this war is the composition of Harry Jordan, prepared for the signatures of his "bosses."

After reading and re-reading this, in our opinion, masterpiece of suggestions, it is the writer's thought that if he tried for 201 years, a better job could not be done in the same direction. On this score no secret is made of the fact that much of this "open letter" to water works men is being repeated in this space without as much as the change of a punctuation mark. The highlights which we believe warrant the emphasis of repetition follow:

Save!

"What does saving mean in water works? First, it means a stop to leaks in mains. Did we hear you say 'there are no leaks in our system?' Sorry, Sir! there ain't no such system. It's only a question of how big they are. Don't kid yourself! There are leaks in your system that are worth stopping. So tighten up the mains.

"Are there war industries in the town? There is your number one spot for an anti-waste campaign. A new, rapidly expanding industry, built in a hurry, staffed in a hurry, is full of wasteful habits.

"How about saving through salvage? Is there a man in this country today who does not know that there is critical need for scrap iron, scrap brass and copper and scrap rubber? Play your part in the local salvage drive. Look into your storehouse! Is there a bit of equipment there that you have not used for years and probably never will use again. Don't be an old fuddy-duddy who keeps things just because he can't make up his mind to get rid of them. Clear out that junk! *That's saving that serves the war effort* 100 *per cent.*

Stretch!

"What do we mean—stretch? Well, believe it or not—one thing to stretch is pipe! But you say water pipe won't stretch. Yes, it will. It (nine times out of ten) can do more work than it is now doing. How does a water pipe work? By delivering. Suppose that there are lines of pipe in your city that have tuberculated so that they will deliver only 50 or 60 per cent of their rated capacity and additional pumping pressure is required to maintain delivery. You can stretch that line by cleaning it out. That is one way to stretch. Keeping up efficiency of boiler or power and pumping plant is another. No plant is too small to aim at efficiency. Re-read Homer Beckwith's 1939 A. W. W. A. Journal story of 'A Simple Method of Testing Centrifugal Pumps.' Try out your pumps along the line he suggests—then tune them up. Coal and electric power are going to be priceless during the next few months. Use them efficiently!

[Note—Mr. Beckwith's excellent suggestions and directions for checking pump efficiency and improving such is to be found in the Annual Reference and Data Numbers of WATER WORKS AND SEWERAGE for 1940, '41 and '42—indicative of our appraisal of it.—L. H. E.]

"Have you a filter plant to stretch? It can be done. How many 'out' hours are charged up on your log sheet? Why? How far short of rated capacity are you operating those filters? Can you justify anything short of operating your existing plant at fullest permissible capacity before thinking of asking for an extension to the plant? Prepare the water better by intelligent and adequate use of coagulants. If chlorine at the super or breakpoint rate will serve to speed up production as well as quality of water, use it. Discuss your problem with your chlorine supplier. There is good reason to believe that if the question is more chlorine vs. more equipment, the way can be found to get more chlorine for water plants that can show the need. If more efficient use of our present equipment (and no new filters) will help win this war, why not operate at full efficiency?

And—Share!

"Finally—what about sharing? Water works men in many states have been ready for months to share materials, men and equipment if a bombing comes. They call it Mutual Aid Planning. But some of them have planned in the way that you send flowers to a friend—when he's dead. The bombing hasn't come, but the shortages in pipe and valves and all the rest of those things have come. The shortage, however, does not exist in the average water works plant. Our people, on the whole, have taken care of that reserve against bombing pretty well. In fact, some people in authority think that they have done it too well. They point out that the inventories of maintenance and repair materials in the larger water plants are 20 per cent above the allowable limit. They also point out that today there are ordnance plants, navy depots and dozens of military production centers that cannot get into operation today for want of water pipe valves and the like.

"There isn't enough surplus in our hands to fill all those needs, by no means. But there is today—and this is serious—there is today in the yards of American water works plants a substantial amount of critical finished goods that *can* be spared today. By none of the rules of the War Production Board and by none of the British records of what is actually needed, can some of the water works now defend the excess inventory they have today. Hoarding helps Hitler whether its sugar or cast-iron pipe. So get rid of your surplus inventory. Let somebody with a job to do today put it to work today. Strip your reserves down to what you had two years ago, and what is, we now know, to be (on the average) all you need."

We know that there is not a real water works or sewerage man in this country that is not intent on seeing victory come as quickly as possible and at the least cost of America's flower of manhood. He wants to find ways to do his job well and to have that personal satisfaction of doing his part in the War Winning Campaign. At heart, sacrifice is not his worry and he has no intent of hoarding critical materials needed in War Production. (Let's stop calling it "Defense" from here out!)

Therefore, with A. W. W. A.'s Wolman, Howson and Jordan (and other lesser lights that fall in with their suggested formulae) we too say, let *"Save, Stretch and Share—To Win"* be the banner of the water works man. And every man do his damnedest in FIGHTING UNDER IT.

"PANCAKES" to flatten the Axis

The same properties of great strength, corrosion-resistance, toughness and workability that have made Everdur and other copper alloys ideal engineering metals for water works and sewerage construction are being utilized to the limit by the armed services of our nation . . . as shell cases of which you see the beginning here . . . as fuel and high pressure hydraulic lines in aircraft . . . for non-rust construction in the Navy and Merchant Marine.

As you can see, tremendous quantities of Copper, Brass and Everdur are required for all America's tools of attack and are playing an important part in making us the mightiest nation on earth.

42107

ANACONDA Everdur COPPER-SILICON Metal

THE AMERICAN BRASS COMPANY—General Offices: Waterbury, Connecticut

Subsidiary of Anaconda Copper Mining Company • In Canada: Anaconda American Brass Ltd., New Toronto, Ontario

for QUICK REPAIRS

in DEFENSE EMERGENCIES!

For wartime emergency-breaks in pipe lines, this Doublex Simplex Split Sleeve will enable you to make quick, economical, effective repairs. You should have a supply of several of each different size that you might need. Thousands in use, some for 13 years. Order now from shipping point nearest you as follows: Birmingham, Dallas, Kansas City, Los Angeles, Minneapolis, San Francisco, Pittsburgh.

AMERICAN CAST IRON PIPE CO.

BIRMINGHAM, ALA.

Dallas Houston El Paso Pittsburgh Kansas City
Chicago Minneapolis New York City Cleveland
Los Angeles San Francisco

UNDIVIDED RESPONSIBILITY

- You will be assured of coordinated results and centralized responsibility if your water conditioning plant is completely INFILCO equipped.
- Standardizing on INFILCO Products makes it possible to place undivided equipment responsibility in the hands of one single manufacturer.

- Write today for Bulletin 60—"INFILCO Equipment for Municipal Water and Sewage Plants."

INFILCO INCORPORATED — FORMERLY INTERNATIONAL FILTER CO. 325 W. 25th PLACE, CHICAGO, ILL.

MEETINGS SCHEDULED

Aug. 25-28—HOUSTON, TEXAS
American Society Sanitary Engineers. Secretary, J. W. Walker, City Hall, Waterbury, Conn.

Aug. 25-26—HARRISBURG, PA. (Penn-Harris Hotel)
Pennsylvania Sewage Works Operators' Ass'n. (Annual Meeting.) Sec'y, Bernard S. Bush, State Dept. Health, Harrisburg, Pa.
(Note: This meeting has been cancelled.)

Aug. 27—HARRISBURG, PA. (Penn-Harris Hotel)
Pennsylvania Water Works Operators' Ass'n. (Annual Meeting.) Sec'y, I. M. Glace, 22 South 22nd St., Harrisburg, Pa.
(Note: This meeting has been cancelled. The meeting scheduled below for the Western Section of the Pa. Association will be held. The Eastern Section will meet jointly with the Four States Section of A.W.W.A. in Philadelphia, as listed.)

Sept. 9-11—TRAVERSE CITY, MICH. (Park Place Hotel)
Michigan Section, A.W.W.A. Sec'y, M. N. Gerardy, Sup't Water Supply, Water Board Bldg., Detroit, Mich.

(Meeting jointly with)

Michigan Conference on Water Purification. Sec'y, R. J. Faust, Dep't of Health, Lansing, Mich.
Note: These Michigan meetings cancelled.)

Sept. 15-16—BOSTON, MASS. (Hotel Statler)
New England Water Works Association. Sec'y, Frank J. Gifford, 613 Statler Bldg., Boston, Mass.

Sept. 17-18—CHEYENNE, WYOMING (Frontier Hotel)
Rocky Mountain Section A.W.W.A. Secretary, B. V. Howe, 201 Argonaut Hotel, Denver, Colo.

Sept. 18—PITTSBURGH, PA. (Roosevelt Hotel)
Western Pennsylvania Section A.W.W.A. Secretary, E. P. Johnson, 418 Flannery Bldg., Sta. 13, Pittsburgh, Pa.

Sept. 20-22—LOS ANGELES, CALIF. (Hotel Clark)
California Sewage Works Association. (15th Annual Convention.) Sec'y-Treas., Jack H. Kimball, Orange Co. Health Dept., P. O. Box 355, Santa Ana, Calif.

Sept. 21-23—WILLISTON, N. D. (Great Northern Hotel)
North Dakota Water & Sewage Works Conference. Secretary, K. C. Lauster, Bismarck, N. D.

Sept. 23—SPRINGFIELD, MASS. (Hotel Kimball)
New England Sewage Works Association. (One day Conference.) Sec'y-Treas., LeRoy W. VanKleeck, State Dept. of Health, Hartford, Conn.

Sept. 24-26—ST. PAUL, MINN. (Lowry Hotel)
Minnesota Section A.W.W.A. Secretary, A. M. Finch, Wallace & Tiernan, Inc., 416 Flour Exchange, Minneapolis, Minn.

Sept. 26—LIVINGSTON, N. J. (Doerr's Grove)
New Jersey Sewage Works Association. (4th Annual Outing). Secretary, John R. Downes, Plainfield, N. J.

Sept. 28-29—HURON, S. D. (Marvin Hughitt Hotel)
South Dakota Water & Sewage Works Conference. Secretary, W. W. Towne, State Board of Health, Pierre, S. D.

Oct. 7-9—PHILADELPHIA, PA. (Benjamin Franklin Hotel)
Four States Section A.W.W.A. Secretary, H. Lloyd Nelson, 1624 Lincoln-Liberty Bldg., Philadelphia, Pa.

(Meeting jointly with)
New Jersey Section A.W.W.A. (Secretary, C. B. Tygert, P. O. Box 178, Newark, N. J.

Oct. 12-14—ROCHESTER, N. Y. (Sagamore Hotel)
American Society Mechanical Engineers. Secretary, 29 West 39th Street, New York, N. Y.

Oct. 12-14—LITTLE ROCK, ARK. (Marion Hotel)
Southwestern Section A.W.W.A. Secretary, Lewis A. Quigley, City Water Works, 3320 W. Berry, Fort Worth, Texas. (Conference War Time Problems.)

MEETINGS SCHEDULED

Oct. 14—FRYEBURG, ME.
Maine Water Utilities Association. Secretary, Earle A. Tarr, Winthrop, Me. (Next meeting Dec. 10th, Bangor, Me.)

Oct. 15-16—ALBANY, N. Y. (DeWitt Clinton Hotel)
New York Section A.W.W.A. (War Conference.) Sec'y-Treas., R. K. Blanchard, 50 West 50th St., New York, N. Y.

Oct. 18-21—CLEVELAND, OHIO (Statler Hotel)
American Public Works Association. (Annual Public Works Congress.) Exec. Dir., Norman Hebden, 1313 East 60th St., Chicago, Ill.

Oct. 19-21—PADUCAH, KY. (Irving Cobb Hotel)
Kentucky-Tennessee Section A.W.W.A. Secretary, H. D. Schmidt, Div. San. Eng., State Dept. of Health, Nashville, Tenn.

Oct. 20-21—WAUSAU, WISC. (Hotel Wausau)
Wisconsin Section, A.W.W.A. Secretary, Leon A. Smith, Sup't of Water Works, City Hall, Madison, Wis.

Oct. 21—HARRISBURG, PA. (Penn-Harris Hotel)
Pennsylvania Water Works Association. (Meeting devoted to Wartime Problems.) Secretary, I. M. Glace, 22 South 22nd St., Harrisburg, Pa.

Oct. 22-23—TORONTO, ONT. (Royal York Hotel)
Canadian Institute on Sewage and Sanitation. Sec'y-Treas., A. E. Berry, Ontario Department of Health, Parliament Buildings, Toronto, Ont.

Oct. 22-24—ST. LOUIS, MO. (Coronado Hotel)
Missouri Valley Section, A.W.W.A. Sec'y, Earle L. Waterman, 104 Engineering Hall, University of Iowa, Iowa City, Ia.

Oct. 22-24—CLEVELAND, OHIO (Hotel Statler)
Federation Sewage Works Associations. (3rd Annual Convention.) Sec'y, H. W. Wisely, Urbana-Champaign Sanitary District, Urbana, Ill.
(In conjunction with Ohio Conference on Sewage Treatment.)

Oct. 22-24—CLEVELAND, OHIO (Hotel Statler)
Ohio Conference on Sewage Treatment. (Meeting with Federation of Sewage Works Asscciations). Sec'y-Treas., W. D. Sheets, 568 E. Broad Street, Columbus, Ohio.

Oct. 27-30—ST. LOUIS, MO. (Jefferson & Statler Hotels)
American Public Health Association. Exec.-Sec'y, Dr. Reginald M. Atwater, 50 West 50th St., New York, N. Y.

Oct. 28-30—OAKLAND, CALIF. (Hotel Oakland)
California Section, A.W.W.A. Sec'y, H. Arthur Price, Dept. Water and Power, 316 West 2nd St., Los Angeles, Calif.

Nov. 2-4—DURHAM, N. C. (Washington Duke Hotel)
North Carolina Section, A.W.W.A. Sec'y, R. S. Phillips, Chief Chemist, Water Department, 206 Dacian Ave., Durham, N. C.

(Meeting jointly with)

North Carolina Sewage Works Ass'n. (22nd Annual Meeting). Sec'y-Treas., R. S. Phillips, 206 Dacian Ave., Durham, N. C.

Nov. 5-6—(Place not decided)
Virginia Section, A.W.W.A. Secretary, F. H. Miller, Ass't Engr., Bureau of Sanitary Engineering, Dept. of Health, Richmond, Va.

Nov. 9-10—HANNIBAL, MO. (Mark Twain Hotel)
Missouri Water & Sewerage Conference. Sec'y-Treas., W. A. Kramer, State Board of Health, Jefferson City, Mo.

Nov. 12-14—MIAMI, FLA.
Florida Section, A.W.W.A. Secretary, A. P. Black, Prof. of Agricultural Chemistry, University of Florida, Gainesville, Fla.

HERE'S THE FLOW RATE CHART THAT'S REALLY *Easy to read*

GET THE WHOLE STORY AT A GLANCE!

Why worry with factors and "microscopic" low rate readings when all Simplex MS meters use an evenly spaced chart—with even graduations from 0 to maximum.

WHAT DOES THIS MEAN TO YOU?

1—The direct reading chart with 0 factor only assures the same high accuracy and ease of reading anywhere in the flow range from minimum to maximum flow.

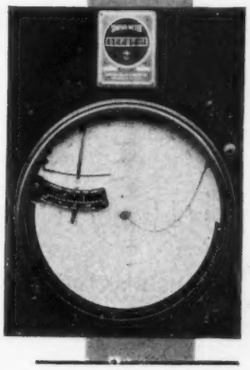
2—Even graduations make it easy to read low as well as high flows from a distance.

3—Greater accuracy of chart readings from planimeter.

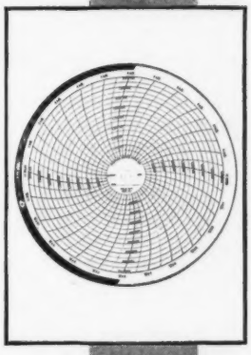
4—Extreme accuracy of chart record is inevitable since pen arm connects directly with bell-shaped float.

5—Special moisture proof paper eliminates stretching and shrinkage—chart cannot slip in use.

Simplex has "engineered" the chart on the MS meter as well as every mechanical detail. This direct reading chart is made possible because of the unique bell-shaped float which extracts the square root of the law of flow. Here is accuracy, ease of recording, and ease of reading—yours for the using in every Simplex Type MS meter. There is no finer meter at the price. Specify Simplex MS meters. Write for details today.



MS meters can be set up as indicator; recorder; indicator and recorder; indicator and totalizor; recorder and totalizor; or indicator, recorder, or totalizor.



12" circular chart for daily or weekly removal. Electric or mechanical clock drive.

SIMPLEX VALVE & METER CO.
6743 UPLAND STREET, PHILA., PA.

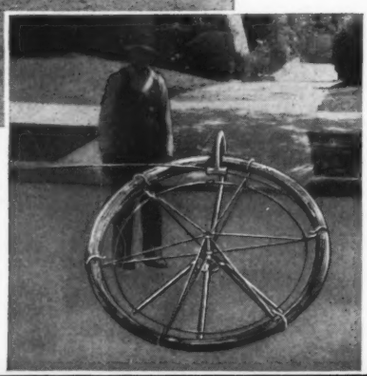
SIMPLEX METERS
THE METER WITH THE BELL SHAPED FLOAT

SAVE TIME and LABOR with FLEXIBLES

FLEXIBLE Power Drive

THE NEW, IMPROVED "EZY" ROD REEL and STAND

Ask for folder describing the new EZY Rod Reel and Stand that eliminate stooping, hooking and unhooking when winding or rewinding FLEXIBLE rods.



LET FLEXIBLE TOOLS MAKE UP FOR PRESENT SHORTAGE OF LABOR

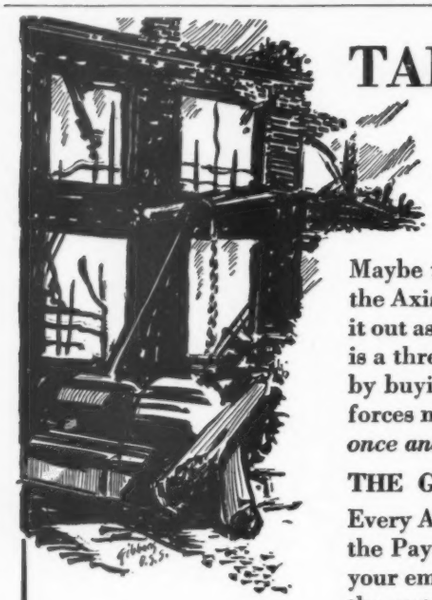
Don't let the present scarcity of men interfere with necessary sewer cleaning. Clean sewers are essential to American health and morale—

With FLEXIBLE tools a few men can clean more underground pipe than an entire crew can with out-moded methods. FLEXIBLES eliminate the time consuming, hot, unsanitary part of the work.

Conserve the Nation's man-power. Use FLEXIBLES. Ask for New Catalog showing complete line of Time- and Labor-Saving FLEXIBLE tools.

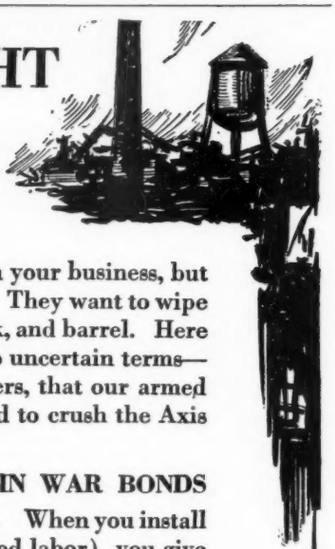
FLEXIBLE SEWER-ROD EQUIPMENT CO.

9059 VENICE BOULEVARD, LOS ANGELES, CALIFORNIA
401 BROADWAY, NEW YORK, N. Y. • PICKWICK BLDG., KANSAS CITY, MO.



TARGET FOR TONIGHT

...*Your Business?*



Maybe they won't actually come and drop a *bomb* on your business, but the Axis war lords have their eye on it, just the same. They want to wipe it out as a competitive force—or take it over lock, stock, and barrel. Here is a threat that you can reply to *now*, today, and in no uncertain terms—by buying War Bonds to the very limit of your powers, that our armed forces may have the guns, tanks, and planes they need to crush the Axis *once and for all.*

THE GOAL: 10% OF EVERYONE'S INCOME IN WAR BONDS

Every American wants the chance to help win this war. When you install the Pay-Roll War Savings Plan (approved by organized labor), you give your employees that chance. For details of the plan, which provides for the systematic purchase of War Bonds by voluntary pay-roll allotments, write: Treasury Department, Section S, 709 12th St. NW., Washington, D. C.

Buy War Savings Bonds

This space is a contribution to America's All-Out War Program by

WATER WORKS AND SEWERAGE

LITERATURE AND CATALOGS

National Gate Valves are furnished in a range of sizes which cover all requirements for water works piping installations. Complete design data is given in an illustrated folder recently published by the National Machine Works of Chicago, manufacturers of water works and sewage plant equipment for the past fifty years. Valves are of the double disc, parallel seat type, heavily proportioned to a high factor of safety to meet every condition of operating service. The wedging mechanism does not become operative until the discs line up opposite the ports. Then the two lower spreaders and one upper spreader, each operating independently of one another, exert a three-point spreading contact, assuring uniform pressure on the discs and a water-tight gate. A simplified diagram shows all working parts of the valve. Also included in the folder is an illustration and description of the National Sluice Gate. Drawings show frames that take care of all methods of securing the gate to the foundation. National valves are fabricated in strict accord with the specifications of the A. W. W. A. To obtain a copy of National's valve and sluice gate bulletins, address National Machine Works, 1559 N. Sheffield Ave., Chicago, Ill.

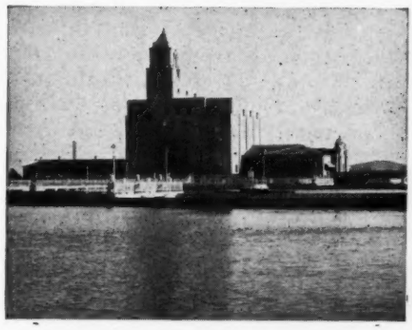
Simplex Standard Manometers are the subject of a recently published bulletin from Simplex Valve and Meter Co. describing their complete line of Standard Manometers. Included are details of Simplex Manometers for the measurement of air, water, steam, boiler feed, and industrial liquids, as well as flow, back wash, and loss of head in filter plants. This bulletin presents both the Type MAC portable unit and the Type MAP for use with the WK Method of turbine flow measurement. Included are specification details, capacities, and method of connection, together with a reference section of useful manometer data. A copy will be sent upon request to Simplex Valve and Meter Co., 68th and Upland Streets, Philadelphia, Pa.

BUY DEFENSE BONDS

AND SAVINGS STAMPS

ONE OF THE

WORLD'S LARGEST WATER SYSTEMS



Water Treating Plant, Metropolitan Water District of Southern California

100% Beckman pH CONTROLLED!

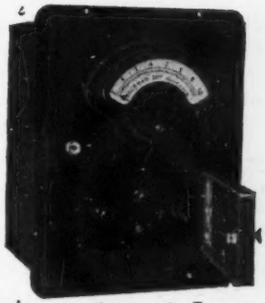
IMAGINE a giant water system capable of delivering ONE BILLION gallons of water *per day* across the entire state of California. That's the $200,000,000 Metropolitan Water District, *one of the largest construction projects of all time!*

With millions at stake, no chances could be taken with inferior equipment. That's why the Automatic pH control on this vast project is *100% BECKMAN!*

In the giant treating plant where the water is softened and purified, BECKMAN pH Instruments control the pH of the liming process . . . the pH of the carbonation process . . . and the pH of the final treated water.

No finer tribute than this 100% installation could be paid to the unfailing dependability and outstanding quality of BECKMAN pH Equipment!

WHAT YOU CAN DO WITH BECKMAN pH CONTROL!



This Beckman Automatic pH Instrument can take over the complete pH job in your plant. It will not only give *automatic* and *continuous* indication of pH in your water treating operations, but it can also be equipped to give a full pH *Record* for future checking and completely automatic pH *Control* over your processes. You can set the instrument to maintain optimum pH conditions at all times, thus insuring more uniform water treatment . . . and eliminating "overdosing" and waste of chemicals.

This instrument is the most advanced pH equipment you can buy, operates from standard 115 A.C. current and incorporates all of the newest pH developments such as Sealed and Shielded Glass Electrodes . . . Automatic Temperature Compensation . . . *Full* Alternating Current Operation (no batteries) with built-in voltage regulator . . . use of Beckman High pH and High Temperature Electrode assemblies for difficult conditions . . . and many others. Send for Bulletin 16 which gives complete details on this outstanding instrument!

THERE IS a Beckman pH Instrument for every size and type of water treating job from the *Automatic* instrument described above for large-scale operations to *portable* instruments for plant and field use. Send us details on your particular problem and our engineering staff will be glad to make specific recommendations!

NATIONAL TECHNICAL LABORATORIES • SOUTH PASADENA, CALIF.

WORLD'S LARGEST MANUFACTURER OF GLASS ELECTRODE pH EQUIPMENT

Beckman THE LEADING NAME IN pH

"Varec".....A VITAL WORD IN THE VOCABULARY OF Every SANITATION ENGINEER .....

Thousands of service installations all over the world, backed by progressive engineering, advanced design, first-class craftsmanship and materials, together with rigid inspection and laboratory tests, insure the quality of "VAREC" products.

Fig. No. 58 C

"VAREC" Approved Pressure Relief and Vacuum Breaker Valve with Flame Arrester

Installed on digester and gas holder domes, it affords emergency pressure and vacuum relief and prevents flame entrance from atmospheric disturbances. Its telescopic flame-arresting element insures easy inspection and maintenance.

Other "VAREC" Products

Flame Trap Assemblies, Pressure Relief and Vacuum Breaker Valves, Flame Arresters, Flame Checks, Regulators, Check Valves, Drip Traps, Manometers, Explosion Relief Valves, Manhole Covers, Sample Hatches.

THE VAPOR RECOVERY SYSTEMS CO.
Compton, California

Branch Offices and Stocks Carried at New York City; Tulsa, Oklahoma; Houston, Texas

"A Guide to Wartime Care of Electric Motors" is the title of the new maintenance handbook published by Allis-Chalmers. Information in this valuable handbook, which contains no advertising, applies to all makes of standard, general-purpose motors. Stressing the importance of continuous motor operation to our war effort and the increasing difficulty of obtaining new motors, the booklet discusses in turn each factor that interferes with trouble-free motor life. Dust is branded as "Electric Motor Enemy No. 1" and following dust such "enemies" as moisture, stray oil, friction, vibration, misalignment, uneven wear, overload and underload. The handbook gives evidence where, as a result of scrupulous care, a motor's working time has been increased from 1,800 to 8,700 hours a year. The final section is a "Quick Diagnosing of Motor Ailments," broken down motor symptoms that can be readily seen and heard. Possible causes and cures appear alongside each symptom. A copy of the handbook and guide may be obtained by addressing the Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Tar and Creosote Products from the plants of the Republic Creosoting Company and the Reilly Tar and Chemical Corp. are described and illustrated in a new attractive bulletin. Specifications and performance data are given for a large variety of chemicals and creosoted materials. Republic creosoted products include wood floor blocks, planking and flooring, mine and structural timber, joists, ties, telephone poles, crossarms, and fence and highway posts. Reilly Tar and Chemical Corporation produce a complete line of waterproofing paints and steel pipe coatings. Among these is the Reilly CA No. 40, a cold application for steel surfaces that gives a hard, pliable surface and will not crack or peel; and the Bituminous Pipe Dip Compound, designed for use on cast iron pipe. For a copy of the bulletin write to Reilly Tar and Chemical Corp., Merchants Bank Bldg., Indianapolis, Ind.

BUY WAR BONDS

AND SAVINGS STAMPS

The Finest

THAT SKILL AND EXPERIENCE CAN BUILD

To our Railroads, America pays thankful tribute! They are doing a magnificent job in speeding troop and war material movement. Since pioneer days, our railroads have led the world in quality, efficiency and capacity. They are the finest that skill and experience can build.

But for these railroads—the shops that build locomotives, cars, rails and equipment, there had to be an abundance of water. With amazingly few exceptions, it was Layne who designed and built their Well Water Systems. Layne Wells and Pumps are famed for their high efficiency, long life and low upkeep cost.

Layne Well Water Systems, like our great American railroads are doing a magnificent job. They are standing up to unmerciful treatment—day after day and month after month of continuous full capacity operation. It is in this tragic period of emergency that Layne reliability, skillful design and rugged construction is most appreciated. Thousands of Layne Well Water Systems are serving railroads, factories, municipalities, irrigation projects and both the Army and Navy. For late catalogs, bulletins, folders, etc., address,

LAYNE & BOWLER, INC.
Memphis, Tenn.

LAYNE PUMPS & WELL WATER SYSTEMS

Affiliated Companies

Layne-Arkansas Company.....Stuttgart, Ark.
Layne-Atlantic Company.....Norfolk, Va.
Layne-Bowler New England Corp....Boston, Mass.
Layne-Central Company.....Memphis, Tenn.
Layne-Northern Company.....Mishawaka, Ind.
Layne-Louisiana Company.....Lake Charles, La.
Louisiana Well Company.....Monroe, La.
Layne-New York Company.....New York City
Layne-Northwest Company.....Milwaukee, Wis.
Layne-Ohio Company.....Columbus, Ohio
Layne-Texas Company.....Houston, Texas.
Layne-Western Company.....Kansas City, Mo.
Layne-Western Co. of Minn.....Minneapolis, Minn.
International Water Supply, Ltd..London, Ont.

WORLD'S LARGEST WATER DEVELOPERS

Threading Ills and Their Correction is the subject covered in an illustrated folder from A. M. Byers Co. Intended to help the workman to recognize and correct faulty threading of steel and wrought iron pipe, a "Trouble Shooting" illustrated chart has been prepared for posting in the pipe shop. The pictures reveal the several types of weak and defective threading easily recognizable. Opposite each picture appears suggestions of what to look for as the cause and names the "cure" for the trouble. There is also printed several helpful threading hints and the "Dos" and "Don'ts" in pipe threading. Anyone desiring a copy of this instructive threading guide and chart should request a copy from A. M. Byers Co., Pittsburgh, Pa.

"Pump Design Affords Wide Scope in Application" by H. Gartmann, an article appearing in the April, 1942, issue of "Machine Design," has been reprinted in folder form by De Laval. To afford a workable understanding of the limitations and potent potentialities of centrifugal pumps Mr. Gartmann begins his article with an analysis of the design features which affect pump characteristics and performance. The influence of blade angles and of the areas of wheel passages upon the head-capacity curve is explained by means of simple diagrams. It is shown how, once the characteristic curves of a given pump at a certain speed are known, it is possible to predict delivery, head and power requirements and efficiency at a different speed. The article will be found enlightening to those pump users who are seeking special operation from substantially standard pumps. A copy of the reprint can be secured by writing to the De Laval Steam Turbine Co., Trenton, N. J.

Schramm-Fordair No. 60 and No. 105 Compressors are described and illustrated in a new Catalogue No. 4215. Among the Model 60 types illustrated are the standard two-wheel portable unit, a de luxe portable unit with tool boxes, the standard skid mounting, a special skidded outfit furnished with lifting bale and side handles, a self-propelled railcar unit, a crawler outfit, and three kinds of stationary compressors. The Model 60 "Powair" is a unique unit, designed for mounting underneath a Ford V8 hood. The original truck motor is removed, and the replacement unit has four cylinders for driving the truck and the other four

Dependable

ISCO Ferri-Cl_3Or

(*Ferric Chloride* 60%)

IMMEDIATE DELIVERY from our plant at Niagara Falls or from stocks maintained at New York and other convenient points.

INNIS, SPEIDEN & COMPANY
Established 1816
117 Liberty Street . . . . . NEW YORK
CHICAGO • CLEVELAND • CINCINNATI
BOSTON • PHILADELPHIA • GLOVERSVILLE, N. Y.

Low cost AIR

Two "R-C" Aerating Blowers direct connected to sludge gas engine at Sioux Falls, S. D.

Roots-Connersville Aerating Blowers, direct-coupled to sludge gas engines, offer the most economical, efficient, and simplified means of aerating sludge at varying flow rates. Sludge gas engine speed is easily varied to suit the air demands, and "R-C" Positive Displacement Blowers operate at varying speed and pressure without loss of volumetric efficiency.

Lengthening deliveries, due to wartime demands, should bring consideration now of future needs.

Roots-Connersville Blower Corp.
208 Mount Avenue **Connersville, Ind.**

All Out for Victory

Roots Connersville Since 1854 Aerating BLOWERS

CLAIMS OR PERFORMANCE —IN ACTIVATED CARBON?

THESE TWO TESTS GIVE THE ANSWER

THRESHOLD ODOR TEST

CARBON FEED CHART

THE way to get more efficient palatability control is to check carbon performance for yourself. Use the Threshold Odor Test. Start a Carbon Feed Chart. Determine now which carbon does the most effective job in your plant.

We'll be glad to send you a sample of Hydrodarco—the activated carbon specially made for water treatment.

HYDRODARCO

Distributing Points: New York, Cincinnati, St. Louis, Buffalo, Chicago, Kansas City, San Francisco, Los Angeles, Marshall, Tex.

Hydrodarco—Reg. U. S. Pat. Off.

DARCO CORPORATION

60 East 42nd St., New York, N. Y.

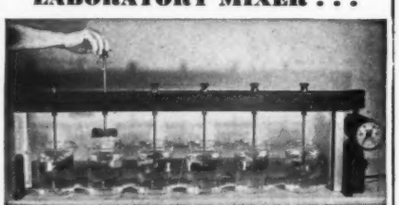
operate as a compressor. All controls are operated from the dash board. Model 60 compressors are also furnished in a "shipping unit," devoid of mounting, to enable the purchaser to incorporate the compressor with his present equipment. The eight-cylinder Model 105 delivers 105 cubic feet of air at pressure of 100 pounds. The power take-off unit illustrated requires a surprisingly small amount of space behind the truck cab. Several stationary Model 105s are shown. The catalogue contains numerous photographs illustrating all compressors as well as a variety of construction tools recommended for use with Schramm equipment. A copy can be secured by addressing Schramm, Inc., West Chester, Pa.

Rotary Positive Blowers are covered in a new 20 page Bulletin 22: 23-B-11 just issued by the Roots-Connersville Blower Corp. Profusely illustrated, showing numerous installation views, details of construction, etc., on the inside front cover will be found a brief account of the inception of the rotary positive blower by the Roots brothers, who patented the principle in 1859. Three interesting curves are presented in connection with a discussion of the operating principle of these blowers. Then follows views of four different types of gears in matched pairs, and the manufacturer stresses the importance of accurate gear cutting, which they do themselves. On the opposite page are sectional views of standard blower types. Eight pages are devoted to installation views and thereafter typical accessories are shown and discussed in considerable detail. Specifications are followed by a table of sizes, including capacity, speed, horsepower, etc. For a copy of this newest R-C bulletin, write Roots - Connersville Blower Corp., Connersville, Ind., or any branch office.

"Economics of Water Meter Testing and Repair" is the title of a 14-page booklet recently published by the Neptune Meter Co., discussing the problem of unaccountable water loss. Recent surveys indicate that leakage in mains combined with water furnished free to municipal services account for only a portion of lost water. A large part of the remainder is attributable to service connection leakage, unmetered services, or inaccurate registration of flow through meters. When meters are improperly maintained they tend to under-register or ignore small flows. In metered cities, where over 25 per cent of water used flows through the meter at one gallon per minute or less, it is important that small flows be properly registered. A systematic, long range plan for testing and repairing meters is suggested, the cost being apportioned over a period of years. The booklet backs up its findings with the results of numerous surveys and tests. For a copy write to the Neptune Meter Co., 50 West 50th St., New York, N. Y.

"Chemical Feeding" is the title of a 12-page bulletin recently released by the American Water Softener Co. Illustrated with charts, flow diagrams and cross-sectional photographs, the bulletin tells the importance of applying chemicals in precise and controlled dosages. American electro-magnetic proportioneers are recommended for feeding aluminum sulphate, lime, pulverized carbon, sodium sulphite, and phosphate. Design and operating features for three types of feeders are given in the bulletin, along with complete specifications and a table of sizes and capacities. The final page is a detachable form to be filled out by engineers requiring recommendations and/or quotations. For a copy write American Water Softener Co., Philadelphia, Pa.

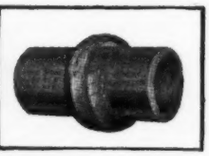
THE *Phipps & Bird* LABORATORY MIXER . . .



IS the important piece of equipment in the Modern Water Works Laboratory. Now being used by leaders in water works research. Many superintendents and chemists have been able to reduce their chemical costs by the control of chemical dosages with this mixer. Write for literature.

PHIPPS & BIRD, INC. Richmond, Va.

WESTON



GASKET AND FORM

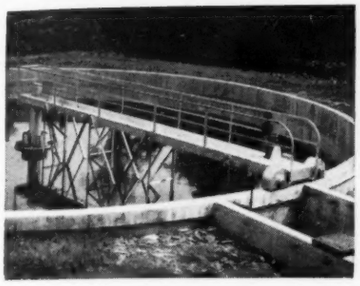
The Perfected Method for Making SEWER PIPE JOINTS OF CEMENT

- No jute used—gasket centers spigot.
- Definite space in each joint for cement.
- Form confines cement-grout to lower portion of joint.
- Particularly advantageous in water-bearing trenches.
- Infiltration minimized.

L. A. WESTON Adams, Mass.

EQUIPMENT NEWS

Link-Belt Adds New Features to "Circuline" Sludge and Scum Collectors



● Link-Belt Co. has added new features to their Sludge and Scum Collectors for circular tanks.

One improvement, pictured above, involves the adaptation of rubber-tired wheels for supporting the outer end of the "Circuline" sludge collectors. These wheels run directly on the top of the concrete tank wall, eliminating the need for the T rail track of former models. In addition the troublesome item of setting track bolts in the concrete wall is eliminated, and further economy results in this quarter also.

On first thought this reviewer saw better traction and absence of ice troubles in the rubber tired wheels. However, it was recalled that the bridge and mechanism of the "Circuline" collector are driven around at the tank periphery by the ingenious sprocket arrangement which runs along a fixed open-link chain around the inside of the tank wall. The sprocket is said to "walk around the chain", since its teeth engage link after link of the fixed chain and pulls the bridge along by such "chain-walking." The chain normally is below flow level and thus protected from ice coating and in a good measure from corrosion also.

The second improvement, here pictured, involves the scum removal unit. A screw conveyor is supported along one side of the bridge span for the purpose of confining and more effectually moving the collected scum to the scum box. It is said that this improvement prevents the wind from blowing the accumulated scum out of reach of the scum-gathering unit.

On the floor of the tank the "Circuline" sludge collector is the same "Straight-Line" type of conveyor, which by its back and forth travel pushes the sludge to the central annular sump. With center inlet, the flow is radial and the heaviest solids drop nearest the sludge sump to lessen the work of the collector mechanism.

For literature more effectively illustrating and describing these improvements, write Link-Belt Co., Philadelphia or Chicago.

Reilly Primer and Pipe Enamel

● The dependable protection which REILLY coatings give to metal surfaces has been demonstrated in years of service—under the most severe conditions of soil and weather. As an outside coating on water mains, oil and gas pipe lines, REILLY Enamel prevents corrosion from moisture, electrolysis, soil acids and alkalies; resists abrasion and soil stress, and withstands wide extremes of temperature. On the inside of water mains, the smooth, mirror-like REILLY lining prevents incrustations and tuberculation, and assures permanent full-capacity flow. . . . REILLY coal tar paints give effective and economical protection to tanks, stacks, structural steel and other metal exposed to atmosphere, corrosive gases and vapors. Booklet describing these protective coatings will be sent on request.

Reilly COAL TAR PRODUCTS

17 PLANTS to Serve the Nation

REILLY TAR & CHEMICAL CORPORATION

Executive Offices: Merchants Bank Building, Indianapolis, Indiana

2513 S. DAMEN AVENUE, CHICAGO, ILLINOIS 500 FIFTH AVENUE, NEW YORK, N. Y. ST. LOUIS PARK, MINNEAPOLIS, MINN.

SEVENTEEN · PLANTS · TO · SERVE · YOU

★ THE NATIONAL METHOD • OVER 35 YEARS EXPERIENCE ★

GUARANTEED TO RESTORE 95% ORIGINAL CAPACITY

DEFENSE DEMANDS

FULL CAPACITY MAINS

MANY cities that now find their water supply resources sadly overtaxed by the additional thousands of water users in defense industries and nearby army training camps, are turning to the *NATIONAL METHOD of water main cleaning* as an economical means of improving water service.

Cleaning by THE NATIONAL METHOD restores clogged mains to at least 95% of their original carrying capacity, making unnecessary large expenditures for auxiliary pipe lines, increased power at the pumps, new standpipes, etc.

Before Cleaning

After Cleaning

The NATIONAL METHOD

The National Water Main Cleaning Co.

30 Church St. Branches: New York

115 Peterboro St., Boston, Mass.
910 William-Oliver Bldg., Atlanta, Ga.
7103 Dale Ave., St. Louis, Mo.
3812 Castellar St., Omaha, Neb.
406 Fla. Theatre Bldg., Jacksonville, Fla.
205 W. Wacker Dr., Chicago, Ill.
501 Howard St., San Francisco, Calif.
2028 Union Ave., Montreal, Can.

84" pipe—Spring Lake, N. J.

FLANGED PIPE

FLEXIBLE JOINT PIPE

BELL & SPIGOT PIPE

SPECIAL CASTINGS

SHORT BODY BELL & SPIGOT SPECIALS

Large stock enables us to make prompt shipments.

CAST IRON PIPE

SIZES 2" TO 84"

Warren Foundry & Pipe Corp.

11 Broadway, New York

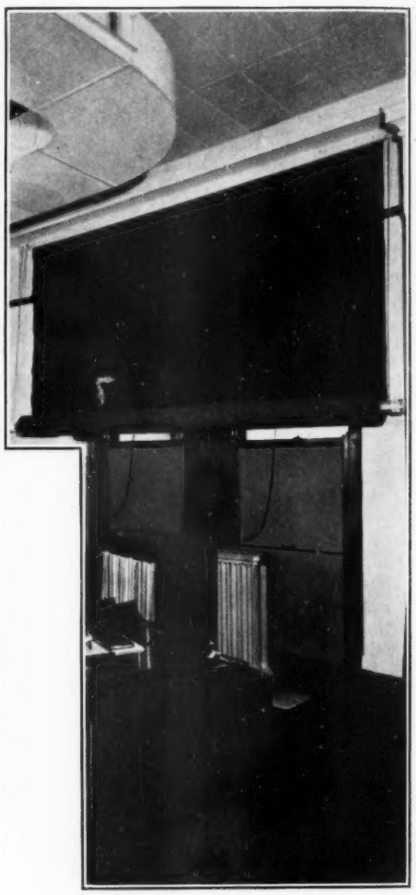
Warren Pipe Company of Mass., Inc.

75 Federal St., Boston

Blackout and Safety Air Raid Blankets

● Safety Air Raid and Blackout Blankets of the well known "Ozite," long used as a cushion under carpets and rugs, are being offered by the Clinton Carpet Co. of Chicago, Los Angeles and New York.

Pointing out in a discriptive brochure, that more casualties and damage to equipment during air raids resulted from flying fragments and glass splinters than from bomb hits, the Ozite Blanket is suggested for all windows, sky-lights, etc. A method of installation is here pictured and the brochure contains many more suggested methods for factories, utility plants, etc., where neatness is part of first importance. The installation pictured is merely a roll-up such as is commonly used on porch screens.



The Ozite Blanket is fabricated of tough cattle hair felted to an adhesive fabric center and is obtainable in four thicknesses of the familiar waffle-set construction. It is recommended for protection of any windows above the second floor, and skylights. The material is supplied in rolls 9 x 50 ft. and 12 x 50 ft., the buyer making his own hanging arrangements from the suggested methods illustrated in detail.

The Air Raid Safety Blanket is made to "take-it" in ground and second floor protection. It is the same "Ozite" of tough cattle hair but with metal mesh

SPECIALIZING

For forty-five years we have specialized in making better settings for water meters.

But now, although we are still serving our customers to the best of our ability, we are specializing in making munitions and are as proud of our products as ever.

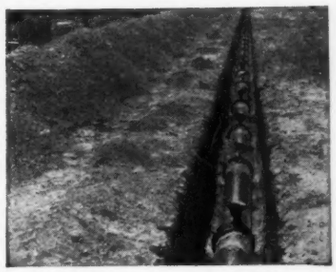
In spite of doing well over 50% war work we are at your service in helping maintain your Ford equipment at maximum efficiency.

FORD METER BOX CO.
WABASH, IND.

LEADITE

The Pioneer Self-Caulking Material for C. I. Pipe

Makes ends meet . . .



••Permanently

For jointing cast iron bell & spigot water pipe there's nothing quite like LEADITE—Used with satisfaction by Water Works Men for over 40 years, LEADITE saves all along the line,—and, it improves with age.

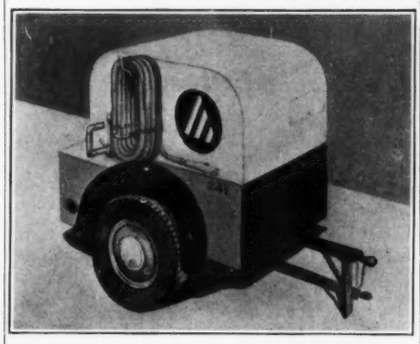
THE LEADITE COMPANY
Girard Trust Co. Bldg., Philadelphia, Pa.

No Caulking

reinforcing wire center. It is cut with heavy carpet shears. These blankets will char but not burn in a flame blast. It is not injured by water, even when soaked. It comes in the same size rolls as the lighter Blackout Blanket.

For further details, request a copy of the Blackout and Safety Blanket brochure by addressing Clinton Carpet Co., Merchandise Mart, Chicago; 295 Fifth Ave., New York City; or 1535 N. Ditman St., Los Angeles.

Auxiliary Water Purifier Also Serves as First Fighting Apparatus



● A completely self-contained, trailer type water purification unit that serves also as emergency fire fighting apparatus has been developed by the Technicraft Engineering Co. of Los Angeles. The portable unit, called the Sterozone Hydrovan, makes use of ozone as the sterilizing and taste destroying agent. The Hydrovan is turned into a high pressure fire fighting engine by a simple clutch to cut out the Sterozone purification unit and deliver water at 200 pounds pressure through the 2½" hose.

The unit is mounted on a two-wheeled trailer and can be taken anywhere a car can be driven. Equipped with 50 feet of 4½" intake hose and 400 feet of 2½" fire fighting hose, the Hydrovan permits operation over nearly a 500 foot range from water storage to fire location. The enclosed gasoline engine drives the electric generator and the fire pump. Water can be purified at the rate of 20 gallons per minute or delivered through the fire hose at 200 gallons per minute. Complete specifications of the Sterozone Hydrovan can be obtained from the Technicraft Engineering Co., 5610 South Soto St., Los Angeles.

Step-Valves the Heart of Milton Roy Pumps

● "Four Steps Ahead in Pumping Practice" is the maxim of Milton Roy Pumps, of Philadelphia.

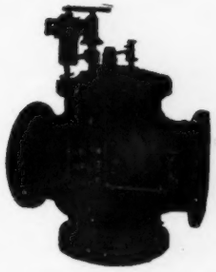
Admittedly the Milton Roy Step Valve is not exactly new, but has never appeared in these columns and therefore will be interesting and also new to many of our readers.

The accompanying illustration pretty much tells the story in itself. Two of the ball step valves (double checks so

·1879·
ROSS
·AUTOMATIC VALVES

ALTITUDE VALVES
for
Control of elevation and heads into and out of tanks, basins and reservoirs.
1. Single acting.
2. Double acting.
3. Combination assembly for three or more automatic operations.

COMBINATION VALVE
Combination automatic control both directions through the valve.
A self-contained unit, with three or more automatic controls.



REMOTE CONTROL VALVE
Electric remote control—solenoid or motor can be furnished.
Adapted for use as primary or secondary control on any of the hydraulically controlled or operated valves.

ROSS VALVE MFG. CO.
INCORPORATED
P. O. BOX 595, TROY, N. Y.

ECONOMICAL

Many users tell us of savings made by using Ferri-floc to condition sludge—resulting in

1—Lower chemical costs

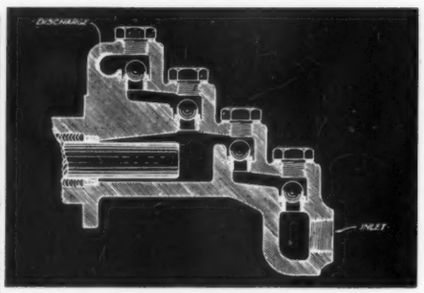
2—Simpler operation

3—Higher plant food value of sludge

Write for free samples and literature today!

Ferri-Floc
TC
FERRIC SULPHATE

Tennessee Corporation
ATLANTA, GA. LOCKLAND, OHIO



to speak) are on the suction side and two are on the discharge side of the piston displacement chamber. In Milton Roy Chemical Feed Pump the dosage is varied by changes in length and speed of the displacement piston travel. Much, therefore, depends upon the exact and spontaneous seating of the ball checks as to the accuracy of pump delivery of chemical solution. In consequence, the double ball valve is featured to preclude the danger of a single ball not seating perfectly for any reason.

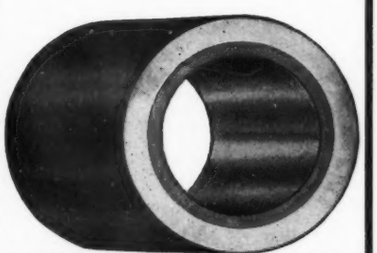
The same general Step Valve construction is employed on pumps for handling slurries or sludges, the parts and balls being larger of course. The design is what is known as self-cleansing and non-clogging, due to the continuous rising and falling and turning of the valve balls.

A new Bulletin No. 426 thoroughly describes and pictures the several features of Milton Roy Pumps with these interesting double ball valves. For a copy write Milton Roy Pumps, 1300 East Mermaid Ave., Philadelphia.

THE LINING IS IMPERVIOUS — THE JOINTS ARE LAPPED

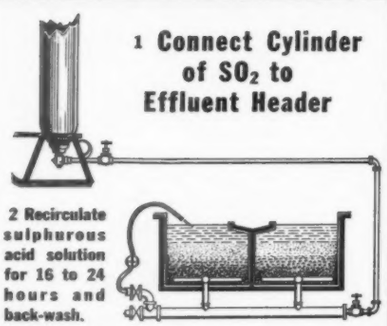
LIPCo PIPE

AVAILABLE *Now!*
Immediate DELIVERY
ON
STEEL, TONCAN IRON
AND WROUGHT IRON
Cement Lined Service Pipe



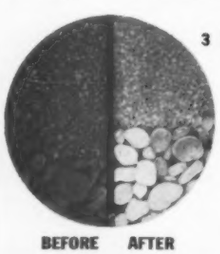
CEMENT LINED PIPE CO.
Lynn, Mass.

HOW TO CLEAN SAND FILTERS in 24 HOURS



1 Connect Cylinder of SO_2 to Effluent Header

2 Recirculate sulphurous acid solution for 16 to 24 hours and back-wash.

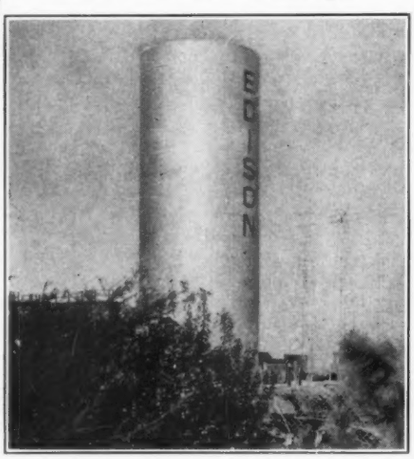


3 RESULT: Clear, white sand and gravel; time, labor and money saved

BEFORE AFTER

V VIRGINIA SMELTING COMPANY
WEST NORFOLK, VIRGINIA

30 Year Record for Bituminous Coatings



● The dependable service and permanence of coal-tar base protective coatings has probably nowhere been more effectively demonstrated than is found in the 30-year record of the above pictured standpipe at Long Beach, Calif.

In 1912 this standpipe of the California Edison Co. (35 ft. diameter and 98 ft. high) was coated with Bitumastic Primer followed by "Bitumastic" Enamel applied hot by hand-brushing.

The 2 M.G. elevated tank of Charleston, S. C., was coated some 15 years or more ago by the same method and

INSTALLATIONS WORLD WIDE — LARGEST CITY TO SMALLEST VILLAGE

VALVES COMPLETE EQUIPMENT FOR WATER WORKS FILTRATION AND SEWAGE DISPOSAL PLANTS
LATEST "COREY TYPE" HYDRANTS

Write for Catalogue and Information
IOWA VALVE CO.
General Offices:
Hubbell Bldg., Des Moines, Iowa
Plant:
Oskaloosa, Iowa

up to date has an equally satisfactory record for permanence.

In 1929 the Long Beach open top standpipe, where the sun shines most of the time and comes down pretty strongly, was inspected, and while there was sagging of the coating near the top that below normal water line was in perfect condition—no rust; no blisters. That was after 17 years of service.

Again in 1939—after 27 years of service—an inspection revealed no different conditions from the 17-year inspections. Now the record has been extended to 30 years and this is thought to be the longest experience record for coal-tar enamel in under water protection of steel plates. Such a record is impressive enough to rate the space given it in this column. And, while hot application of bituminous enamel is expensive and necessitates long out of service periods the record confirms the truism that a job worth doing is worth doing thoroughly. Certainly this applies to standpipes, tanks and conduits in water supply systems which can rarely ever be spared from service for periods required for the most adequate rehabilitation.

WITH THE MANUFACTURERS

Manufacturer's Association News

● Arthur Clark, secretary-manager of the Water and Sewage Works Manufacturers' Association, has introduced an interesting innovation in the nature of his "News Letter" which is intended to inform members in the Association of "What's New."

The issue of August 12th, the first we believe, introduces the newest member of the Association—The Mueller Brass Co. of Port Huron, Mich., as a Class "A" member. Also it lists the 10 firms which have become new members in recent months. These are: American Well Works (Water and Sewage), Dearborn Chemical Co. (Water and Sewage), Dickey Clay Mfg. Co. (Sewage), Flexible Underground Pipe Cleaning Co. (Water and Sewage), Graver Tank and Mfg. Co. (Water and Sewage), T. W. Mortell Co. (Water), Mueller Brass Co. (Water and Sewage), Jos. G. Pollard Co., Inc. (Water), M. B. Skinner Co. (Water), Westinghouse Elec. & Mfg. Co. (Water and Sewage).

The W&S Wks. Mfgrs. Asso. now has a membership representing 165 firms. Of these 73 hold memberships in both the Water and Sewage Divisions; 62 in the Water Division alone; and only 13 appear in the Sewage division alone. Seventeen firms carry a limited (sectional) membership because of the nature of their products and limited area of distribution.

Permanent . . . . .

REDWOOD PIPE Saves critical materials! Long known as a pipe with greater carrying capacity than metal or concrete. Does not clog, scale or pit.

LOWER labor, installation and maintenance costs. Long life, no electrolysis, contamination of water, or destruction by sulphur, salt water or other mineral impurities. New type Wyckoff California Redwood Pipe for water supply and sewage lines is a proven product.

A. Wyckoff & Son Company

ELMIRA, N. Y.

Originators of Machine Made Wood Pipe

1855 — Our 87th Anniversary — 1942

HYDRO-TITE

ONE POUND does the work of four pounds of lead. Much easier to use than lead and requires no caulking.

HYDRO-TITE joints are strong, very flexible and tight.

Write for our free trial offer.

HYDRAULIC DEVELOPMENT CORPORATION

MAIN SALES OFFICE - 50 CHURCH STREET, NEW YORK
GENERAL OFFICES AND WORKS - WEST MEDFORD STATION, BOSTON, MASS.

OVER 25 YEARS WITHOUT A FAILURE

PREPARE FOR EMERGENCIES WITH

M H

VALVES
HYDRANTS
AND WATERWORKS ACCESSORIES

M & H products, including pipe line accessories, are well known for high quality of material and expert workmanship. They are made according to standard specifications and have been used for many years throughout the country. Write for Catalog No. 34.

M&H VALVE AND FITTINGS COMPANY

ANNISTON, ALABAMA

BAILEY METERS AND CONTROLLERS

FOR SEWAGE TREATMENT AND WATER SUPPLY . . .

● Venturi Tubes, Weirs, Flumes, Nozzles and other primary elements; Mechanically and Electrically operated Registers and Complete Automatic Control Systems.

BAILEY METER COMPANY
1072 IVANHOE ROAD • CLEVELAND O.
Bailey Meter Co. Ltd., Montreal, Canada

Tegul-MINERALEAD

IMPROVED JOINTING COMPOUND
for Bell & Spigot Main

- Sulphur base; quick sealing, speeding laying and backfilling.
- 10 lb. ingot form, easily handled, stored and shipped. Impervious to rain. Cannot change composition.
- Makes permanently tight joints. Goes 3 to 5 times as far as lead, helping conserve a strategic war metal.
- For money-saving information, write

The ATLAS MINERAL Products Company of Pa.
Mertztown · · · · Pennsylvania

EDSON'S NEW HAND PUMP

Smallest Diaphragm Pump Made, 2" Suction Open Discharge. Capacity 1400 G.P.H. Weight 50 lbs. Size No. 1.

THE EDSON CORP'N
49 "D" Street
So. Boston, Mass.

NEW YORK: 142 Ashland Pl., Brooklyn

Catalog "T" Gives Full Data. Also Edson Hand and Power Pumps, Suction Hose and Pump Accessories

ANTHRAFILT

A Filter Medium For All Purposes

ANTHRACITE EQUIPMENT CORP.
19 Rector St. New York

H. G. Turner Research Engineer
STATE COLLEGE, PA.

Results of Mfgr's. Ass'n. Elections

The following are the results of elections held in Chicago during the annual meeting of the Water and Sewage Works Mfgrs. Assn. on June 23rd.

As announced in our July issue Dan. S. McAfee (Dorr Co.) was elected President of the Association. Chas. A. McGinnis (Johns-Manville) became vice-president and Edgar Buttenheim (American City) was renamed treasurer and Arthur T. Clark manager and secretary.

To the Board of Governors—Johns-Manville Co., Mathieson Alkali Works, Roberts Filter Mfg. Co. Simplex Valve and Meter Co., R. D. Wood Co.

To the Executive Committee of the Water Division — Builders-Providence, Inc. (formerly Builders Iron Foundry), Hersey Mfg. Co., Ross Valve Mfg. Co.

To the Executive Committee of the Sewage Division — Link Belt Co., Nichols Eng. & Research Corp., Sewage Works Engineering.

Each of the above firm elections are for three-year terms, becoming effective at the close of the fiscal year of the Association on November 1, 1941. The executive officers serve for one-year terms only.

Frank J. Hill Made Vice-President of Green, Tweed & Co.

● Frank J. Hill, sales manager of Green, Tweed Co., manufacturers of Palmetto packings and other mechanical packings and special tools has been elected vice president of the company. Mr. Hill has been connected with Green, Tweed & Co. since 1915.

Navy "E" Awarded De Laval

● For outstanding achievment in the production of turbines, gears, pumps and other equipment vital to the United States Navy, the Navy "E" burgee, symbol of "Work Well Done," was presented to the De Laval Steam Turbine Co., Trenton, N. J., June 29, 1942, at which time also the employees received the "E"" lapel insignia.

HELP WANTED

WANTED—Designing Engineer thoroughly familiar with Sewage Treatment Equipment. We want a man who will be capable of assisting in redesign and improvement of existing line of Mechanical Equipment plus development of new items. In reply state qualifications and salary desired. Box No. 53, Water Works & Sewerage, 155 East 44th St., New York City.

POSITION WANTED

AS SUPERINTENDENT of filtration or chemist and bacteriologist of small or medium size purification plant. Technical courses by correspondence in Electrical Engineering, water supply, water softening, hydraulics, chemistry. Seven years at evening engineering college. No degree. Seventeen years' experience. Box 726, Water Works and Sewerage, 330 S. Wells St., Chicago, Ill.

SAVE MONEY USE ACTIVATED ALUM and BLACKALUM

STUART-BRUMLEY CORP.
516 North Charles St.
Baltimore Maryland

ZECO GREENSAND ZEOLITE

ZECO and HI-ZECO Greensand Zeolite for water softening, filtration and iron removal. ZECO Manganese Zeolite for iron and manganese removal. COREXITE mineral for corrosion control and water stabilization.

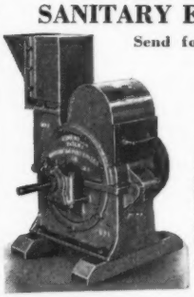
ZEOLITE CHEMICAL CO.
Sales Office: 140 Cedar St., New York, N. Y.
Factory: Medford, N. J.
Pioneer Producer of GREENSAND ZEOLITE MINERAL

GRUENDLER'S 57th YEAR

SANITARY ENGINEERS

Send for facts on our latest

"NON-CLOG" SEWAGE SHREDDERS
for Municipal Plants



For the disintegration of Rag Stock, Garbage, Floatables, and Fibrous Materials *without Choke Down* so as to pass Screen Bar—

"Gruendler selected by U. S. Navy"

GRUENDLER
CRUSHER & PULVERIZER CO.
2917-29 N. Market St., St. Louis, Mo.

The Meter-Master

RATE RECORDER FOR WATER METERS

Send for Literature

F. S. BRAINARD & CO.
246 Palm Street, Hartford, Conn.

INQUIRIES INVITED
on all Problems of
WATER TREATMENT

Whether your problem of water rectification is large or small, we have a form of equipment to serve your needs. We manufacture and install equipment for Gravity Filtration and Softening Plants; Pressure Filters and Zeolite Softeners; Swimming Pool Recirculating Appliances; and Water Treatment Units of all types.

ROBERTS FILTER MFG. CO.
607 COLUMBIA AVE.
DARBY, PA.

AERO-MIX
AERATOR — MIXER

Down-Draft Type
MECHANICAL
SEWAGE AERATORS

Write for information on AER-O-MIX for your SEWAGE or WATER TREATMENT APPLICATION.

VOGT MFG. CO.
INCORPORATED
P. O. Box 1122 Louisville, Ky.

Frank S. Dunham Dies—Permutit Sales Engineer for 25 Years

● It will come as a shock to many of our readers to learn of the death of Frank S. Dunham in Chicago on July 23, 1942. Mr. Dunham had been associated with The Permutit Co. in the sale of water conditioning equipment since 1915. During this time his helpfulness and fine character made many friends for Frank Dunham and his company.

Born in Baltimore, Md., on March 8, 1876, he began his engineering studies at the Armour Institute of Technology and completed his work in chemical engineering at the University of Chicago. His early career in engineering began with the Hydrox Corporation of Chicago, which he joined following his graduation from the University. Subsequently, he was a chemical engineer with the Kennicott Company, manufacturers of water softening equipment, until he became associated with The Permutit Co., which he served from 1915 until his retirement two years ago.

He is survived by his widow, Mrs. Edna Alice Dunham, and two sisters.

Cecil Brown New J-M Newscaster

● Cecil Brown, (Ohio State 1929) famous Columbia Broadcasting System war correspondent and eye witness of the sinking of the Repulse and Prince of Wales off Singapore last December, is now being heard as the newscaster in the place of Elmer Davis on the popular Johns-Manville radio news broadcast. This change took place when Mr. Davis was chosen by President Roosevelt to head the new Office of War Information.

A trained observer and reporter of facts, Brown came through with colors flying on the story of the sinking of the two great British capital ships, that earned him the praise of thousands of radio listeners. Among tributes to Brown's abilities as a reporter was the Peabody award for the best radio news reporting of 1941, which cited his reports from Cairo, Singapore and Australia as "remarkable for their accuracy and courage."

New Cochrane Agents

● Cochrane Corp. of Philadelphia announces the appointment of Energy Control Co. of Philadelphia as representatives of Cochrane Flow meters in eastern Pennsylvania, southern New Jersey, Delaware and Maryland.

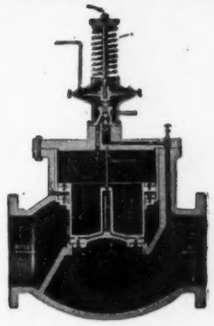
Energy Control Co. is headed by J. T. Vollbrecht, whose 20 years' experience in instrumentation gives him a broad background of training and experience. Associated with Mr. Vollbrecht is C. L. Myers, also with many years of plant and process engineering experience. William Ruglass is in immediate charge of the Philadelphia office located at 3107 North Broad St.

BUILDERS
WATER AND SEWAGE PLANT
Instruments

Bulletin 318—profusely illustrated, in two colors—lists 13 FEATURES of this mechanical flow meter. Sectional views thoroughly explain construction and operation. Eight drawings show correct installation under various operating conditions, and as connected to control chemical feeding in proportion to flow. Write for a copy. Address:

BUILDERS—PROVIDENCE, INC.
(Division of Builders Iron Foundry)
9 Codding St. — Providence, R. I.

Stop Check
Single Acting
Altitude Valve



This valve installed in the upstream line automatically maintains a uniform water level within 3" to 12" variation to prevent any tank overflow; also, by means of the internal "stop check" piston assembly, prevents loss or return of storage water back through the valve—making the valve very desirable for use where metered water is purchased, or wherever it is imperative that there be no possible return flow.

This valve may be fitted with "Differential" Control for delayed opening, if desired.

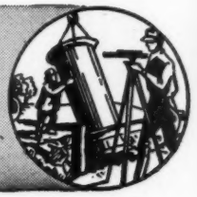
Write for specifications and prices.

GOLDEN-ANDERSON
VALVE SPECIALTY CO.
Fulton Building Pittsburgh, Pa.

Consulting Engineers

SPECIALIZING IN THE FIELD OF

WATER WORKS & SEWERAGE



Albright & Friel, Inc.
Consulting Engineers

Water, Sewerage, Industrial Waste, Garbage, Power Plant and Valuation Problems.

1520 Locust St.
Philadelphia, Penn.

Alvord, Burdick & Howson
Engineers

John W. Alvord
Charles B. Burdick
Louis R. Howson
Donald H. Maxwell

Water Works, Water Purification, Flood Relief, Sewerage, Sewage Disposal, Drainage, Appraisals, Power Generation

Civic Opera Building **Chicago**

Black & Veatch
Consulting Engineers

4706 Broadway, Kansas City, Mo.

Sewerage, Sewage Disposal, Water Supply, Water Purification, Electric Lighting, Power Plants, Valuations, Special Investigations, Reports and Laboratory Service

E. B. Black — N. T. Veatch, Jr.
A. P. Learned — H. F. Lutz
F. M. Veatch — R. E. Lawrence
E. L. Filby

Buck, Seifert and Jost
Consulting Engineers

(Formerly Nicholas S. Hill Associates)

Water Supply, Sewage Disposal, Hydraulic Developments, Reports, Investigations, Valuations, Rates, Design Construction Operation, Management, Chemical and Biological Laboratories.

112 East 19th St. **New York**

Burns & McDonnell
Engineering Co.

McDONNELL-SMITH-BALDWIN-TIMANUS-McDONNELL

Consulting Engineers Since 1897

Waterworks, Light and Power, Sewerage, Reports, Designs, Appraisals, Rate Investigations

Kansas City, Mo., 107 West Linwood Blvd.
Cincinnati, Ohio, 307 East Fourth St.

The Chester Engineers
Campbell, Davis & Bankson

Water Supply and Purification, Sewerage and Sewage Treatment, Power Development and Applications

Investigations, Appraisals, Rates, Testimony, Design, Supervision, Operation, Accounting

210 Parkway at Sandusky Street
Pittsburgh, Pa.

Edward A. Fulton
Consulting Engineer

Investigations, Reports, Valuations, Design and Construction—Water Supply and Purification Plants, Sewerage and Sewage Treatment Works; Municipal Paving and Power Developments.

3 So. Meramac Ave.
St. Louis, Mo.

I. M. Glace
Consulting Sanitary Engineer

WATER SUPPLY AND PURIFICATION
SEWAGE AND SEWAGE TREATMENT

Specializing in Water Quality Problems

Telephone 3-2939 **22nd and Market Sts. Harrisburg, Pa.**

Greeley and Hansen
Engineers

Samuel A. Greeley — **Paul Hansen**
Paul E. Langdon — **Kenneth V. Hill**
Thomas M. Niles — **Samuel M. Clarke**

Water Supply, Water Purification, Sewerage, Sewage Treatment, Flood Control, Drainage, Refuse Disposal

6 N. Michigan Ave., Chicago

Havens and Emerson
(formerly Gascoigne & Associates)

W. L. Havens — **C. A. Emerson**
A. A. Burger — **F. C. Tolles** — **F. W. Jones**

Consulting Engineers

Water, Sewage, Garbage, Industrial Wastes, Valuations — Laboratories

Leader Building, Cleveland **Woolworth Bldg., New York**

Hayden, Harding & Buchanan
Consulting Engineers

John L. Hayden — Gordon E. MacNeill
John H. Harding — Oscar J. Campia

Waterworks, Sewerage, Civil, Mechanical, Electrical, Structural

662 Park Square Building, Boston, Mass.

Morris Knowles, Inc.
Engineers

Water Supply and Purification, Sewerage and Sewage Disposal, Valuations, Laboratory, City Planning.

1312 Park Building, Pittsburgh, Pa.

Lancaster Research Laboratories

Physical and chemical tests of Sewages, Sludges and Industrial Wastes.
Examinations, tests and reports on treatment processes and equipment. Experts in litigation.
Treatment processes for Industrial Wastes.

85 Zabriskie Street
Hackensack, New Jersey
Hackensack 3-2325

Metcalf & Eddy
Engineers

Water, Sewage, Drainage, Garbage and Industrial Wastes Problems
Laboratories — Valuations

Statler Building, Boston **150 Broadway, New York**

Reeves Newsom — E. H. Aldrich

Newsom & Aldrich
Engineer-Consultants

Water Supply, Purification and Distribution
Sewerage and Sewage Disposal
Valuation and Reports

500 Fifth Ave., New York **Harrisburg, Pa. Williamsburg, Va.**

Nussbaumer & Clarke, Inc.

Newell L. Nussbaumer — **Irving Clarke**

Water Supply and Treatment
Sewerage & Sewage Disposal
Garbage Incineration
Town Planning

327 Franklin St. **Buffalo, N. Y.**

Malcolm Pirnie
Engineers

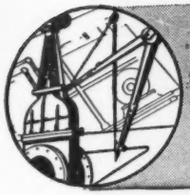
Water Supply, Treatment, Sewerage
Reports, Plans, Estimates
Supervision and Operation
Valuation and Rates

25 W. 43rd St., New York, N. Y.

The Pitometer Company
Engineers

Water Waste Surveys, Trunk Main Surveys, Water Distribution Studies

Penstock Gaugings
New York, 40 Church St.



Consulting Engineers

SPECIALIZING IN THE FIELD OF

WATER WORKS & SEWERAGE

Thomas M. Riddick
Consulting Engineer and Chemist
Municipal and Industrial Water Purification, Sewage Treatment, Operating Supervision of Plants, Sanitary Surveys, Stream Pollution Investigation, Swimming Pool Control. Chemical and Bacteriological Analyses, Testing of Materials.
369 East 149th Street, New York City

Russell & Axon
Geo. S. Russell—John C. Pritchard
Joe Williamson, Jr.—F. E. Wenger
Consulting Engineers, Inc.
Sewerage, Sewage Disposal, Water Works, Filtration, Softening
Power Plants
4903 Delmar Blvd. St. Louis, Mo.

Weston & Sampson
Robert Spurr Weston George A. Sampson
Water Supply, Water Purification, Sewerage, Sewage and Industrial Waste Treatment, Corrosion Control, Laboratory Service, Supervision, Valuations.
14 Beacon St. Boston, Mass.

ROBERT AND COMPANY
Incorporated
Architects and Engineers
ATLANTA, GEORGIA
Water Supply — Sewage Disposal — Incinerators — Power Plants

J. E. Sirrine & Company
Engineers
Water Supply, Sewage Disposal, Power, Reports
Greenville South Carolina

Whitman & Howard
Harry W. Clark, Associate
Engineers (Est. 1869—Inc. 1924)
Channing Howard Paul F. Howard
Walter A. Janvrin C. Roger Pearson
Water Supply, Water Purification, Sewerage, Sewage Disposal, Water Front Improvements and all Municipal and Industrial Development Problems, Investigations, Reports, Designs, Supervision, Valuations.
89 Broad St., Boston, Mass.

Runyon & Carey
Consulting Engineers
Water Supply and Treatment
Sewerage and Treatment
Power Plants
33 Fulton St., Newark, N. J.

Stanley Engineering Company
Water Works — Sewerage
Electric Power
Reports — Design
Supervision — Valuation
Central State Bank Bldg., Muscatine, Ia.

Whitman, Requardt & Smith
Engineers
Ezra B. Whitman Norman D. Kenney
Gustav J. Requardt A. Russell Vellmer
Benjamin L. Smith Theodore W. Hacker
Water Works—Sewerage—Utilities
1304 St. Paul Street, Baltimore, Md.
Albany, N. Y.

UP-TO-DATE REPORT . . .

on the occurrence, movement and work of the earth's waters

PREPARED UNDER THE DIRECTION of the NATIONAL RESEARCH COUNCIL

For the first time the results of the vast research of recent years on the natural waters of the earth are made available in a single, authoritative volume. Another monumental contribution to the literature of geophysics by the National Research Council, this work is the newest volume in the Physics-of-the-Earth Series. Twenty-four specialists cover every phase of hydrology to give you an idea of its present status.

Just Published!

HYDROLOGY

Edited by Oscar E. Meinzer

Geologist in Charge, Division of Ground Water, United States Department of the Interior

712 pages, 6x9, many illustrations, charts, tables.

$7.50

This book brings you full information on the waters of the earth—excepting the oceans—and the development, status, and problems of the science relating to them. Presents the known facts, principles and laws involved in the course and function of all these waters throughout the hydrologic cycle — covering rain, snow, glaciers, rivers, lakes, soil moisture, and the deeper subterranean waters.

Includes new data on:

- snow and snow surveying
- hydrology of glaciers
- transpiration and consumptive use
- infiltration
- runoff
- Hydraulics of ground water
- history of hydrology
- etc.

Order from

WATER WORKS & SEWERAGE
330 South Wells Street
Chicago Illinois

Index TO ADVERTISERS

The Dash (—) Denotes Current Advertisers Who Do Not Appear in This Issue

A

Albright & Friel, Inc. 84
Alvord, Burdick & Howson 84
Aluminum Company of America ..... —
American Brass Company, The 69
American Cast Iron Pipe Co. 70
American Norit Company, Inc. ..... —
American Smelting and Refining Co. .. —
American Well Works, The 4
*Anderson Valve Corp. ..... —
*Anthracite Equipment Corp. 82
Armco Drainage Products Assn. ..... —
A. S. G. Pipe Lining Co. ..... —
*Atlas Mineral Products Co. of Pa., The 82

B

Badger Meter Manufacturing Co. ..... —
*Bailey Meter Co. 82
*Barrett Haentjens & Co. ..... —
Black & Veatch 84
Blake, Frank N. ..... —
Brainard & Co., F. S. 82
Buck, Seifert and Jost 84
*Builders-Providence, Inc. 83
Burns & McDonald Engr. Co. 84

C

*Calgon, Inc. 11
Carborundum Company, The ..... —
Carson-Cadillac Co. ..... —
*Carter Company, Ralph B. ..... —
Cast Iron Pipe Research Assn., The..354C
Cement Lined Pipe Co. 80
Central Foundry Company ..... —
Centriline Corporation ..... —
Chain Belt Company ..... —
Champion Corporation ..... —
Chapman Valve Manufactruing Co. ... —
Chester Engineers, The 84
*Chicago Bridge & Iron Company 9
*Chicago Pump Company 354A
Clark Controller Co., The ..... —
*Cole Manufacturipg Co., R. D. ..... —
Clow & Sons, James B. ..... —
Columbian Iron Works ..... —
Connelly Iron Sponge & Governor Co. —

D

Darco Corporation 76
DeLaval Steam Turbine Co. ..... —
Diamond Alkali Company 5
Dorr Company, Inc., The ..... Third Cover
*Dow Chemical Company, The ..... —
Dracco Corporation ..... —

E

Economy Pumps, Inc. ..... —
Edson Corporation, The 82
Electro Rust-Proofing Co. ..... —

F

Ferguson, S. F. ..... —
*Flexible Sewer Rod Equipment Co. ... 72
*Flexible Underground Pipe-Cleaning Co. ..... —
Ford Meter Box Co. 79
Fulton, Edward A. 84

G

Gardner-Denver Co. 362B
*General Paint Corporation ..... —
Glace, I. M. 84
*Golden-Anderson Valve Spec. Co. 83
*Graver Tank and Mfg. Co. ..... —
Greeley & Hansen 84
Gruendler Crusher & Pulverizer Co. .. 82

H

Havens and Emerson 84
Hayden, Harding & Buchanan 84
*Hellige, Inc. ..... —
*Hill, Hubbell & Co. ..... —
Homelite Corporation, The ..... —
*Hydraulic Development Corp. 81

I

*Industrial Chemical Sales 354B
*Innis, Speiden & Co. 75
*Infilco Incorporated 70
Iowa Valve Co. 80

J

*Jeffrey Manufacturing Company ..... —
*Johns-Manville ..... —

K

Knowles, Inc., Morris 84

L

*Lakeside Engineering Corporation .... —
Lancaster Research Laboratories 84
Layne & Bowler, Inc. 74
Lead Industries Association ..... —
Leadite Company, The 79
Leitz, Inc., E. ..... —
Link-Belt Company ..... —
Lock Joint Pipe Company 362A
Ludlow Valve Mfg. Co., Inc., The 354D

M

*M & H Valve and Fittings Company .. 81
Mabbs Hydraulic Packing Co. ..... —
Macmillan Petroleum Corp. ..... —
Mathews Hydrants 10
Mathieson Alkali Works, Inc., The ... 8
Metcalf & Eddy 84
Monsanto Chemical Co. ..... —
*Mueller Brass Co. 6
Mueller Co. ..... —
Municipal Service Co. ..... —

N

National Cast Iron Pipe ..... —
National Lime Association ..... —
National Machine Works 7
National Technical Laboratories 73
*National Water Main Cleaning Co. 78
Neptune Meter Co. 14
Newsom & Aldrich 84
Niagara Alkali Company 338AB
*Nichols Engineering & Research Corp. —
*Northrup & Company, Inc. ..... —
Nussbaumer & Clarke, Inc. 84

O

*Omega Machine Company ..... —

P

*Pacific Flush Tank Company ..... —
Peerless Pump Division ..... —
*Pennsylvania Salt Mfg. Company .... Second Cover
*Permutit Company, The ..... —
Philadelphia Quartz Co. ..... —
Phipps & Bird, Inc. 76
Phoenix Meter Corp. ..... —
Pirnie, Malcolm 84
Pitometer Company, The 84
*Pittsburgh-Des Moines Steel Co. 3
Pittsburgh Equitable Meter Co. ..... —
*Pomona Pump Co. ..... —
Portland Cement Association ..... —
*Proportioneers, Inc. 12

R

Ranney Water Collector Corp. ..... —
Reilly Tar & Chemical Corp. 77
Rensselaer Valve Co. ..... —
Riddick, Thomas M. 85
Robert and Company 85
Roberts Filter Mfg. Co. 83
Roots-Connersville Blower Corp. 75
*Ross Valve Mfg. Co., Inc. 79
*Royer Foundry & Machine Co. ..... —
Runyon & Carey 85
Russell & Axon 85
Ryan Company, Fred J. ..... —

S

Salomon & Bro., L. A. ..... —
*Schramm, Inc. ..... —
*Simplex Valve & Meter Co. 71
Sirrine & Company, J. E. 85
Smith Company, S. Morgan ..... —
Smith Mfg. Co., The A. P. ..... —
Solvay Sales Corporation ..... —
*Sparling, R. W. ..... —
Standard Dry Wall Products, Inc. ..... —
Standard Silicate Division 5
Stanley Engineering Company 85
*Stewart, W. H. ..... —
*Streamline Pipe & Fittings Division .. —
*Stuart-Brumley Corp. 82

T

Tate Pipe Linings, Inc. ..... —
Taylor and Co., W. A. ..... —
*Tennessee Corporation 80
Thomson Meter Company 14
Treasury Department 72

U

Underpinning & Foundation Co., Inc. .. —
*U. S. Pipe & Foundry Co. 346AB

V

*Vapor Recovery Systems Co. 74
Virginia Smelting Co. 80
Vogt Brothers Manufacturing Co. ..... —
Vogt Manufacturing Co. 83

W

*Wallace & Tiernan Co., Inc. .. Back Cover
Warren Foundry & Pipe Corp. 78
*Westco Division ..... —
Weston, L. A. 76
Weston and Sampson 85
Whitman and Howard 85
Whitman, Requardt & Smith 85
*Wilson Chemical Feeders, Inc. ..... —
Wood Company, R. D. 10
Worthington-Gamon Meter Company. —
Worthington Pump and Machinery Corp. ..... —
Wyckoff & Son Company, A. 81

Z

Zeolite Chemical Co. 82

*Advertisers with * were represented in the June, 1942, Convention and Data Edition with catalog specification copy. Please refer to that issue for additional information on any of their products.

thanks to Camp Sanitation

IN this war as in no other in history, this nation's Fighting Forces are being kept healthy —fit to fight on land, on sea and in the air. Raw, camp sewage—the source of epidemics of water borne contagion—has been attacked and overcome.

The modern military type sewage treatment plant, unlike those in other wars, is attractive, spotlessly clean and odorless. It is the equal technically of any serving civilians in the great cities of the world.

The clear water discharged carries no germs of typhoid, dysentery, or other enteric diseases. It gives off no noxious gases. It is not allowed to form in stagnant pools to breed mosquitoes and flies.

It has been our privilege to provide machines and methods for the sanitary protection of our soldiers, sailors and flyers, quartered at camps, bases, airfields and arsenals in 38 of our 48 states.

This is our contribution to the physical fitness of our Fighting Forces.

BIOFILTRATION

★ Above is a typical Biofilter Plant capable of treating the sewage from a 5,000 man camp.

The Biofiltration System, single or multiple stage, has proved ideal at military camps ranging all the way from 1,000 to 50,000 men.

It gives a uniform effluent with fluctuating feeds; permits 10 times normal filter loadings; and costs 25-50% less to operate than Standard Trickling Filters or Activated Sludge.

DORRCO

THE DORR COMPANY, INC., ENGINEERS

NEW YORK, N. Y. . . . 570 LEXINGTON AVE.
ATLANTA, GA. . . . CANDLER BUILDING
TORONTO, ONT. . . . 80 RICHMOND ST.W.
CHICAGO, ILL. . . . . 221 NO. LA SALLE ST.
DENVER, COLO. . . . . COOPER BUILDING
LOS ANGELES, CAL. . . . 811 WEST 7TH ST.

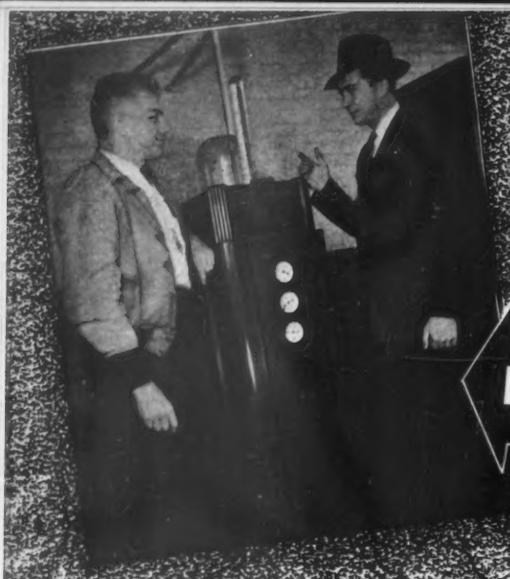
RESEARCH AND TESTING LABORATORIES
WESTPORT, CONN.

SUGAR PROCESSING
PETREE & DORR ENGINEERS, INC.
570 LEXINGTON AVE., NEW YORK

DORR

RESEARCH — ENGINEERING — EQUIPMENT

ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE



EVERYTHING WE'VE LEARNED

HERE

MEANS MORE SECURITY FOR YOU

HERE

WHEN you choose emergency equipment for wartime water protection, consider the peacetime record for meeting *every* type of water purification problem that stands behind it.

Wallace & Tiernan Chlorinators, now protecting over 85% of America's public water supply, have the complete confidence of public health authorities. Service experience over the years, in close collaboration with water works operators, has given us the "know-how" to build *emergency* equipment with *permanent* dependability.

The W&T Emergency Chlorination Trailer uses the well proved principle of Visible Vacuum Solution Feed Chlorinators in a rugged construction suitable for rough transport. Operation paralliels that of plant Chlorinators so closely that the user has nothing newfangled to learn. Chlorine can be applied at rates as high as 300 lb. per day from two 150 lb. cylinders cradled within the unit.

When you buy emergency equipment . . . keep postwar budget protection in mind. For sterilizing mains . . . treating secondary supplies and meeting any need for closely-controlled chlorine application "on location," your W&T Chlorination Trailer will have the widest use-value year after year.

For a complete technical description of the Chlorination Trailer or other emergency equipment, get in touch with your local W&T Representative. SA-137

WALLACE & TIERNAN CO., INC.